



# PERFORMANCE REPORT

OCTOBER 2021

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# Executive Summary

Performance-based planning is integral to MTC and ABAG's regional planning work, providing a framework for decision-making that is supported by the best-available data and analytics.

Plan Bay Area 2050 is no exception, using the most capable modeling tools at our disposal to evaluate the performance of individual investments and strategies, which are packages of investments or policies that would be implemented at the local, regional or state level. In turn, these findings inform policy decisions across the realms of transportation, housing, the environment and the economy and provide the basis for interpreting the anticipated outcomes of the plan's strategies.

A number of performance assessment activities informed Plan Bay Area 2050, as summarized in this report. This includes assessment of individual strategies using modeling tools throughout the Horizon effort (prior to the official kick-off of Plan Bay Area 2050), transportation project-level analysis through Project Performance Assessment, subsequent modeling of packages of strategies comprising the Draft Blueprint and Final Blueprint (also referred to as the Plan for the purposes of this document) and evaluation of EIR Alternatives.

This report also includes a summary of the region's federally required near-term performance targets, progress made toward those targets, and the anticipated impacts of Plan Bay Area 2050 on long-term performance in these areas.

## Methodology

Plan Bay Area 2050 leveraged a strong analytical foundation built upon past performance-based planning cycles, applying simulation models for land use, transportation, demographic and economic forecasts to conduct multiple rounds of performance assessment throughout the planning process. Furthermore, Plan Bay Area 2050 also forged critical advances in analytical frameworks and tools.

Understanding how individual projects and strategies would perform in an uncertain future was a new emphasis area for Plan Bay Area 2050, which prompted the development of new modeling tools and new evaluation methods. Through the Futures Planning effort, MTC and ABAG assessed strategies against three divergent visions of the Bay Area in 2050. Project-level analysis through Project Performance Assessment applied the three Futures to evaluate the performance of major transportation investments under a wider array of circumstances. Strategies and projects that performed well across multiple Futures were considered to be more resilient to uncertainty and prioritized for inclusion in Plan Bay Area 2050 coming out of the Horizon process.

Striving to better understand the equity impacts of transportation projects pushed staff to develop new methods for quantifying the accessibility benefits of major transportation investments. New to Plan Bay Area 2050 was the concept of a quantitative equity score, which represents the distribution of accessibility benefits by income level for major transportation investments. As a part of the Project Performance Assessment methodology, the equity score enabled more in-depth conversations around the merits of various major transportation investments.

An expanded set of performance measures allowed for a more comprehensive analysis of how the strategies in the plan and EIR alternatives advanced the region's progress toward the five Guiding Principles for Plan Bay Area 2050: affordable, connected, diverse, healthy and vibrant, which were adopted by the MTC and ABAG Executive Board in September 2019. Outcomes were presented using an equity lens, wherein performance metrics were determined for all households as well as households with low incomes or households in Equity Priority Communities, where feasible. Performance was assessed based on the magnitude and directionality of change, as opposed to the formal adoption of numeric targets.

## Project Performance Assessment

The Plan Bay Area 2050 Project Performance Assessment evaluated 94 projects, including capital-intensive capacity expansion projects, operational strategies and resilience investments. Among these were projects submitted by county and city governments; MTC-sponsored initiatives; and transformative ideas that MTC directly sought from the public and non-governmental organizations for the first time. The aspirational list of bold, new, high-cost ideas to transform the region's transportation network is long, and the costs of projects already in the pipeline have increased substantially since Plan Bay Area 2040 — highlighting the importance of the performance assessment and calling for a collaborative dialogue with stakeholders to enhance returns on investments and social equity with complementary policies.

Evaluating projects under three divergent future scenarios highlighted that long-term project performance can be significantly impacted by uncertain future conditions. Lower-cost improvements, such as urban bus rapid transit lines and sea level rise protections for heavily used freeways are the best bet in an uncertain future, which the Plan prioritizes in the near term. Regionwide micromobility investments also proved as a resilient investment and beneficial for the overall transportation network by decreasing dependence on driving while yielding health and safety benefits.

The majority of projects evaluated in Project Performance Assessment were found to have at least one area where performance could be improved — relating to the project's alignment with the Guiding Principles, cost-effectiveness or equity impacts. In these cases, MTC worked with project sponsors to identify commitments toward improving the project scope or complementary policies before considering them for inclusion in the Plan. This differs from past long-range plans for the Bay Area, where project descriptions generally did not change in between Project Performance Assessment and analysis of the Plan and EIR Alternatives.

## Plan Equity and Performance Outcomes

Together, the 35 strategies comprising the Plan make significant headway in making the Bay Area more affordable, connected, diverse, healthy and vibrant for all. With sufficient housing for residents of all income levels, including deed-restricted affordable housing that meets the need of all households with low incomes in 2050, the Plan would reduce the burden of housing and transportation costs for all and meaningfully decrease disparities that burden households with low incomes today.

Access to transit, measured as share of households or jobs within ½ mile of transit and accessibility to jobs by all modes, is improved for all households, with better outcomes for households with low incomes. While travel times on key freeway corridors remain roughly constant on average through various strategies acting together, transit demand increases substantially, and crowding continues to persist for select operators — an issue that calls for further exploration in future planning efforts.

The Plan enables more inclusive communities through inclusionary zoning and subsidies for affordable housing in areas with better access to assets and opportunities. Disparities in access to opportunity is lowered as more households with low incomes are able to reside in High-Resource Areas, especially those that are transit-rich as well. Additional Plan strategies that enable intergenerational wealth building opportunities by supporting nearly 100,000 households with low incomes to own their first home and providing rental assistance to households and small businesses further enhance equitable access to opportunity.

Under the Plan, Bay Area residents are also forecasted to be healthier and safer, with more urban park acres per capita; improved air quality; fewer road fatalities and injuries per capita; and lowered risk of adverse impacts from natural hazards like sea level rise, wildfires and earthquakes. The Plan also plans for the Bay Area environment itself to be healthy and safe, with strategies that lower dependence on driving, decrease greenhouse gas emissions substantially, reduce the carbon footprint of the region's building stock and focus most of the new development within the existing urban footprint.

Finally, jobs and housing in the Bay Area are forecasted to be more evenly distributed as Plan strategies deliver more jobs to housing-rich counties and bring more housing to job-rich areas. Robust economic output and job growth indicators suggest that the Bay Area economy is positioned for future economic vibrancy under the Plan, even as new regional revenue sources are required to invest back into the region's transportation, housing, economy and environment.

## EIR Alternatives

Four EIR Alternatives were analyzed for impacts on performance and equity: the Final Blueprint/Plan, a No Project Alternative and two additional EIR Alternatives.

Under the No Project Alternative, the lack of focused growth strategies and geographies results in a more dispersed housing growth pattern by 2050. Only 63% of the new housing growth located in Transit-Rich Areas, relative to 82% in the Plan, and jobs continue to be concentrated in San Francisco County and Silicon Valley. This growth pattern, along with insufficient investment in affordable housing and lack of major freeway demand management strategies, leads to significantly poorer outcomes than the Plan. The region's affordability challenges remain unsolved as the existing housing cost burden and disparities persist. Roughly half of the region's transit-rich and high-resource neighborhoods are forecasted to have a risk of displacement of households with low incomes. Travel times nearly double in some freeway corridors by 2050 and transit crowding increases substantially on some operators, diminishing job accessibility. Health and safety outcomes are forecasted to deteriorate for Bay Area residents, and the region is not able to meet state-mandated emission reduction targets by 2035.

EIR Alternative 1 focuses a greater share of regional housing growth (91%) in Transit-Rich Areas than the Plan (82%). However, most outcomes under this alternative are not significantly different from those of the Plan. Dependence on driving for commuting marginally decreases, but this does not significantly improve environmental outcomes beyond those forecasted under the Plan. Job growth is slightly more dispersed in the region given that a larger share of the developable capacity in Transit-Rich Areas is focused on housing, resulting in a somewhat improved jobs-housing balance.

EIR Alternative 2 explores the environmental impacts of strategies designed to address regional challenges of displacement and gentrification by shifting more housing growth toward well-resourced, job-rich, and exclusionary locations. This results in a slightly lower share of regional housing growth in Transit-Rich Areas (79%) relative to the Plan (82%), but a significant increase in the share in High-Resource Areas (39% vs. 29%), especially in the South Bay where access to jobs is higher. Overall, the share of neighborhoods with risk of displacement of households with low incomes is lower than in the Plan. Equity Priority Communities — many of which are also transit-rich — have an increased risk of displacement, mainly due to households with low incomes relocating to High-Resource Areas. However, a significant downside of this alternative is its adverse impact on the jobs-housing balance. While the Plan and EIR Alternative 1 succeed in dispersing job growth to some housing-rich counties and thereby more evenly distributing jobs and housing across the region, land use strategies needed to yield the housing growth pattern also cause EIR Alternative 2 to further concentrate jobs in already job-rich San Francisco County.

Performance-based planning is integral to MTC's and ABAG's regional planning work, providing a framework for decision-making that is supported by the best-available data and analytics.

Plan Bay Area 2050 (also referred to as Plan) is no exception, using the most capable modeling tools at our disposal to evaluate the performance of individual investments and strategies, which are packages of investments or policies that would be implemented at the local, regional or state level. In turn, these findings inform policy decisions across the realms of transportation, housing, the environment and the economy and provide the basis for interpreting the anticipated outcomes of the plan's strategies.

MTC and ABAG have applied performance-based planning protocols for two decades in their long-range planning work. Beginning with the 2001 Regional Transportation Plan (RTP), packages of transportation investments were compared using a set of performance measures. Furthermore, MTC has employed project-level performance analysis to aid in the selection of transportation projects included in the fiscally constrained project list since the RTP adopted in 2013, going beyond the statutorily required analysis to evaluate individual transportation projects prior to their inclusion in the RTP.

The frameworks and tools used by MTC and ABAG to assess performance are constantly evolving to deploy the latest data, respond to emerging trends and identify new areas of focus. For Plan Bay Area 2050, there were two specific areas of intensified focus within the performance assessment framework: understanding performance under deep uncertainty about future conditions and quantifying performance outcomes for historically marginalized groups. More information on the inclusion of these two focus areas within the performance assessment framework is detailed in Chapter 2 of this report.

Additionally, performance assessment for Plan Bay Area 2050 was supported by advances in simulation modeling capabilities developed in-house at MTC and ABAG, accounting for future uncertainties including sea level rise, earthquake damage, transportation network companies, autonomous vehicles and more. New datasets were collected and curated by MTC and ABAG staff in partnership with local jurisdictions to better represent on-the-ground land use regulations and transportation projects that are fully funded but not yet included within the network of roads and transit routes. More information on updates to the tools and inputs included in performance assessment can be found in the Plan Bay Area 2050 Forecasting and Modeling Report.

This report documents the process spanning four years to evaluate and improve Plan Bay Area 2050's performance. The steps described in this report helped to craft a regional plan that is more resilient to future uncertainties and more equitable, as well as more expansive – identifying and evaluating strategies for the environment and the economy for the first time in a Bay Area regional plan and broadening the scope of strategies recommended for transportation and housing.

### Performance assessment within Plan Bay Area 2050 was anchored by two cross-cutting themes: resilience to uncertainty and equity.

This regional plan considers the period between the years 2021 through 2050, acknowledging throughout the planning process that there is much uncertainty about what the Bay Area of 2050 will look like. A number of factors contribute to that uncertainty, including the success of various technological innovations, national policy direction and economic conditions and the frequency and severity of natural hazards like sea level rise and earthquakes. The breadth and depth of these uncertainties underscore the critical nature of prioritizing resilience to uncertainty.

Advancing equity is a deeply embedded priority throughout MTC and ABAG's work, and Plan Bay Area 2050 is no exception. Crafting strategies to reverse the outcomes of historically inequitable decisions by policymakers and understanding who is likely to benefit from the strategies was an area of intensified focus for this regional plan. While limits do exist in what the analytical tools allow MTC and ABAG to quantify – for example, data are not available to model housing and travel decision making for different racial/ethnic groups – staff used household incomes and home locations as the best available proxies for understanding equity impacts.

Plan Bay Area 2050 sought to take a more proactive stance to assessing the equity impacts of projects and strategies when compared to prior long-range planning efforts. Equity and overall performance impacts were intertwined throughout the performance assessment reporting, shown together where data were available to allow for easy comparison between outcomes for the region as a whole and for subsets of the population. This enabled equity impacts to be a topic of discussion in conversations with Bay Area residents, stakeholders and elected officials.

Throughout the reporting on the performance of Plan Bay Area 2050, the year 2015 traditionally serves as the baseline year against which future years' performance is measured. MTC and ABAG's simulation models are run for five-year increments counting back from the horizon year of 2050, and since historical data on conditions in the year 2020 were not yet available from sources like the U.S. Census Bureau, 2015 was used as the performance baseline. The one exception for this is for reporting on greenhouse gas emissions reductions. For this performance measure, the year 2005 is used as the performance baseline in accordance with Senate Bill 375 (Steinberg).

Performance assessment was closely tied to the Plan Bay Area 2050 Vision, Guiding Principles, and Cross-Cutting Themes (see Figure 1), adopted by the MTC and ABAG Executive Board in September 2019 and based on substantial public feedback collected in 2018.

The Guiding Principles were used to qualitatively assess the project impacts during Project Performance Assessment and were used to structure overarching assessment of outcomes during the Futures Planning process and the reporting of equity and performance outcomes of the Draft and Final Blueprint. Objective criteria were used to measure performance, with performance metrics used to measure the extent to which the Plan Bay Area 2050 Draft Blueprint and Final Blueprint moved the region toward supporting the Guiding Principles. More information on how the Guiding Principles were used for each performance assessment deliverable is available in Chapters 3, 4, and 5 of this report.

**Figure 1.** Plan Bay Area 2050 Cross-Cutting Themes, Vision and Guiding Principles



CROSS-CUTTING THEMES	RESILIENCE & EQUITY
Vision	Ensure by the year 2050 that the Bay Area is affordable, connected, diverse, healthy, and vibrant for all.
GUIDING PRINCIPLE	DESCRIPTION
 <b>AFFORDABLE</b>	All Bay Area residents and workers have sufficient housing options they can afford – households are economically secure.
 <b>CONNECTED</b>	An expanded, well-functioning, safe and multimodal transportation system connects the Bay Area – fast, frequent and efficient intercity trips are complemented by a suite of local transportation options, connecting communities and creating a cohesive region.
 <b>DIVERSE</b>	The Bay Area is an inclusive region where people from all backgrounds, abilities, and ages can remain in place – with full access to the region's assets and resources.
 <b>HEALTHY</b>	The region's natural resources, open space, clean water and clean air are conserved – the region actively reduces its environmental footprint and protects residents from environmental impacts.
 <b>VIBRANT</b>	The Bay Area region is an innovation leader, creating quality job opportunities for all and ample fiscal resources for communities.

Adopted by MTC and ABAG in September 2019

In comparison to past iterations of Plan Bay Area, where quantitative performance targets were established early in the plan development process, Plan Bay Area 2050 featured a reduced emphasis on specific numeric objectives. Rather, Plan Bay Area 2050 assessed performance outcomes based on the direction of change, the magnitude of change, and the diversion of outcomes between the public at large and households with low incomes or residents of Equity Priority Communities (where appropriate).

While most of the discussion of the performance of Plan Bay Area 2050 centered on the direction, magnitude and diversion of change, there were two key instances where quantitative performance targets were used in accordance with state or federal law. The Plan meets the numeric target for reduction in greenhouse gas emissions from transportation of 19% per capita over 2005 levels enumerated in SB 375 and includes sufficient housing to accommodate all projected household growth as required under Government Code Sections 65080(b)(2)(B).

## Timeline of Performance Activities

Plan Bay Area 2050 was developed through multiple iterations of strategy development and performance analysis. This iterative approach provided the opportunity to refine strategies in response to project performance and address the plan's performance deficiencies. The analysis phases completed for Plan Bay Area 2050 are detailed in Table 1.

**Table 1. Timeline of performance activities**

PHASE	ACTIVITIES
<b>Horizon: Strategy Assessment</b> [January 2018 – November 2020]	<ul style="list-style-type: none"> <li>• Futures Draft Report: Status Quo Outcomes</li> <li>• Futures Final Report: Recommendations on Strategies</li> </ul>
<b>Horizon: Transportation Project Performance Assessment</b> [May 2018 – February 2020]	<ul style="list-style-type: none"> <li>• Methodology</li> <li>• Draft Findings Release</li> <li>• Final Findings Release</li> </ul>
<b>Draft Blueprint Performance Assessment</b> [September 2019 – June 2020]	<ul style="list-style-type: none"> <li>• Draft Blueprint Equity and Performance Outcomes Release</li> </ul>
<b>Final Blueprint Performance Assessment</b> [July 2020 – January 2021]	<ul style="list-style-type: none"> <li>• Final Blueprint Equity and Performance Outcomes Release</li> </ul>
<b>Analysis of EIR Alternatives</b> [December 2020 – October 2021]	<ul style="list-style-type: none"> <li>• Final Findings Release as part of Draft EIR</li> <li>• Final Findings Revisions (Incorporating Minor Bug Fixes) as Part of Final EIR</li> </ul>

## Overview of Models Used in Performance Assessment

Simulation modeling is critical to MTC and ABAG's approach to performance-based planning, allowing staff to forecast future impacts and produce apples-to-apples comparisons. This enables data-driven tradeoff discussions and exploration of future policies where limited precedents exist. There are three models used for performance analysis in Plan Bay Area 2050: Regional Economic Models, Inc. (REMI), Bay Area UrbanSim 2 (BAUS 2) and Travel Model 1.5. For a detailed discussion of the forecasting and modeling work that supports Plan Bay Area 2050, see the Plan Bay Area 2050 Forecasting and Modeling Report.

### REMI

The Plan Bay Area 2050 Regional Growth Forecast identifies how much the Bay Area might grow between the plan baseline year (2015) and the plan horizon year (2050), including population, jobs, households, and associated housing units. Staff use the REMI (Regional Economic Modeling Inc.) model to produce the Growth Forecast. This model integrates into one package a dynamic accounting of the core components of the economy: industry structure and competitiveness relative to other regions, propensity to export, and population and labor market structure. The population is explicitly connected to industry growth and demand for labor, with migration increasing in times of strong employment growth.

### Bay Area UrbanSim 2

Bay Area UrbanSim 2 (hereby referred to as BAUS 2) was originally developed by the Urban Analytics Lab at the University of California, Berkeley and is modified and maintained by MTC and ABAG staff, integrating new capacities like the ability to reflect natural hazards (earthquakes, sea level rise, etc.) or the ability to simulate Plan Bay Area 2050

strategies. BAUS 2 features several sub-models simulating the real-world choices and actions of households and businesses within the region, including choices by individual households, real estate developers and businesses. Using input data such as forecasted population demographics, existing land use regulations, parcel sizes, building stock and large development projects already in the pipeline, among many other factors, BAUS 2 produces simulations in five-year increments to demonstrate the changes to the built environment that might occur based on regional policy and demographic/economic conditions. Linkages between BAUS 2, REMI, and Travel Model 1.5 enable the examination of how transportation infrastructure decisions or economic policy impact the behavior of these types of agents.

## Travel Model 1.5

MTC uses the internally-developed and maintained Travel Model 1.5, an activity-based regional travel model that simulate activities of all Bay Area residents on a typical weekday and predicts outcomes for the entire regional transportation network for all modes. External inputs for future conditions such as population and employment forecasts (sourced from REMI), land use patterns (sourced from BAUS 2), telecommute shares and Automated Vehicle/Transportation Network Company penetration, and strategy inputs such as planned transit and road projects, bicycle investment programs, fare policy or freeway pricing strategies are fed into the model. By simulating activities of the population iteratively until equilibrium, the model projects travel activity on the full Bay Area transportation network for a typical weekday by all modes, from which we can gather useful metrics such as user accessibility, travel costs, mode shares, commute distances, freeway travel times, vehicle miles traveled (VMT) and transit ridership. VMT by travel speed and time of day can be fed into the California Air Resources Board's emission factor model (EMFAC) to forecast greenhouse gas emissions. Many of the user-based metrics such as accessibility, travel costs and travel time can be disaggregated across four income levels, allowing for equity analyses. Current model limitations do not enable disaggregation by race/ethnicity.

## Ongoing Performance Monitoring

MTC and ABAG regularly monitor conditions in the region through Vital Signs, an interactive website tracking 41 indicators related to housing, the economy, transportation, the environment and equity. Vital Signs is an integral component of MTC's Congestion Management Process (CMP), which is an ongoing partnership among MTC, Caltrans District 4, cities, County Transportation Agencies, and transit operators to monitor regional transportation performance trends and then plan, fund, and deliver improvements to respond to system challenges. The transportation indicators tracked by MTC and its partners and included on the Vital Signs portal include:

- Commute Mode Choice
- Commute Time
- Commute Patterns
- Traffic Volumes at Gateways
- Time Spent in Congestion
- Miles Traveled in Congestion
- Travel Time Reliability
- Transit Ridership
- Transit System Efficiency
- Transit Cost-Effectiveness
- Daily Miles Traveled
- Street Pavement Condition
- Highway Pavement Condition
- Bridge Condition
- Transit Asset Condition
- See more at: [vitalsigns.mtc.ca.gov](https://vitalsigns.mtc.ca.gov)

The CMP is a necessary tool for understanding and ultimately reducing congestion on the Bay Area's roads and transit systems. MTC updated and expanded the monitoring analyses to forecast future conditions as part of Horizon initiative, which informed the prioritization of strategies and a subset of individual transportation projects for inclusion in the transportation element.

# Chapter 3 | Futures Planning and Strategy

## Performance Assessment

A key goal of Plan Bay Area 2050 was to create a long-range plan that was as resilient to future uncertainties as possible. Horizon, an 18-month long planning effort conducted in the year prior to the initiation of planning work for Plan Bay Area 2050, sought to explore how uncertainty affected the performance of strategies and transportation projects in order to inform Plan Bay Area 2050.

Horizon had four workstreams, described briefly below.

- **Perspective Papers**

Five white papers were produced on the following topics: Autonomous Vehicles, Shared Mobility, Growth Framework, Future of Jobs, and Bay Crossings. These papers delved deeply into a topic of interest for the region, exploring the potential opportunities and weaknesses highlighted by the Perspective Paper topic and recommending strategies for consideration for Plan Bay Area 2050. The majority of the strategies assessed throughout the Horizon and Plan Bay Area 2050 were sourced from the Horizon Perspective Papers.

- **Futures Planning**

Described in detail in this chapter, Futures Planning was an analytical framework for assessing how a range of forces outside of the region's control would shape the region, as well as how strategies would perform. Three divergent Futures were created based on feedback from a daylong stakeholder workshop, which were used as analytical testing grounds for assessing strategy performance and individual project-level performance.

- **Transportation Project Performance Assessment**

Described in detail in Chapter 4 of this report, Project Performance Assessment was a process that evaluated major transportation investments in each of the three futures. The results were used to help policymakers and stakeholders make data-driven decisions about future transportation investments in an era of uncertainty.

- **Public and Stakeholder Engagement**

Described in the Plan Bay Area 2050 Public Engagement Report, community members and stakeholders were given the opportunity to weigh in on which strategies and investments they preferred to address current and future regional challenges.

## Futures Planning

### Development of Futures

The first step in the futures planning process was to generate divergent visions for the future of the Bay Area, called "Futures." MTC and ABAG hosted a daylong workshop in April 2018 which was attended by dozens of planners, advocates and academics from throughout the region dedicated to this end.

Participants were presented with a set of 24 "external forces" – national and global trends that MTC and ABAG staff identified as being outside of the region's control but undoubtedly influential on the region's future. These external forces covered a wide range of topics, including level of sea level rise, autonomous vehicle adoption rate, and global economic and immigration trends.

In an exercise titled "Create a Future," small groups of stakeholders were presented with a mostly blank board with each of the 24 external forces and a set of potential conditions for each of the 24 external forces. For example, the external force "major seismic event" had options for "no major earthquake between now and 2050," "one major earthquake between now and 2050," or "multiple major earthquakes between now and 2050." Each group was presented with two or three external forces that were already fixed, to start the groups off in different places. The groups were instructed to select conditions for each of the 24 external forces that built a coherent narrative – even if it was not what they saw as the most likely future for the Bay Area.

Stakeholder groups produced 11 such future scenarios, which MTC and ABAG staff narrowed down to three by consolidating like Futures and focusing on creating the most divergent scenarios possible. Figure 2 summarizes the external forces for each future.

Figure 2. Summary of external forces by Future

External Forces		Clean and Green	Rising Tides, Falling Fortunes	Back to the Future
Environmental	1	Sea Level Rise	1 Foot	3 Feet
	2	Natural Disasters	2035 Hayward Fault Earthquake (magnitude 7.0)	2035 Hayward Fault Earthquake (magnitude 7.0)
Political	3	U.S. Political System	Healthy Democracy	Flawed Democracy
	4	U.S. Standing in the World	Multiple Superpowers	Declining Power
	5a	U.S. Tax Rates	Higher Tax Rates	Lower Tax Rates
	5b	U.S. Tax Structure	Carbon Tax	Income Tax (Similar to Today)
	6a	U.S. Spending Levels	Higher Expenditures	Lower Expenditures
	6b	U.S. Spending Distribution	Similar Share to Today	Reduced Share for Metro Areas
	7	Immigration Policy	80,000 Annual Immigrants (to Bay Area)	20,000 Annual Immigrants (to Bay Area)
	8	Trade Policy	3% Average Tariff Rate	10% Average Tariff Rate
	9	Environmental Policy	Increased Regulations	Reduced Regulations
Economic	10	U.S. Population Annual Growth Rate	0.7%	0.4%
	11	U.S. Jobs Annual Growth Rate	0.4%	0.5%
	12	U.S. Jobs Distribution	available upon request	available upon request
	13	U.S. Productivity	2.8%	1.6%
Land Use	14	Housing Preferences	Greater Preference for Urban Housing	Greater Preference for Dispersed Housing
	15	Workplace Preferences	Greater Preference for Dispersed Employment Centers	Similar Preference to Today
	16	Telecommute Share	30%	15%
	17	E-Commerce Market Share	50%	20%
	18	Interregional Volumes	Limited Growth Rates	Current Growth Rates
Transportation	19	Transportation Technologies	High Speed Rail, Autonomous Rail and Buses, Freight Aerial Drones	Autonomous Buses
	20	Autonomous Vehicle Market Share	95%	10%
	21	Electric Vehicle Market Share	95%	10%
	22	Sharing Preferences	Greater Preference	Similar Preference to Today
	23	Per-Mile Vehicle Operating Cost	\$0.40 per Mile	\$0.20 per Mile
	24	Annual Federal Transportation Funding (Bay Area)	\$2.5 Billion	\$0.5 Billion

## Rising Tides, Falling Fortunes

Rising Tides, Falling Fortunes is defined by relaxed federal regulations and the elimination of federal programs – from social services to infrastructure. In this Future, the federal government implements costly tariff policies as well as tight immigration restrictions. As a result, an era of slow growth begins across the United States, with particularly significant impacts in regions like the Bay Area. Labor constraints mean that the rate of innovation slows; driverless electric vehicles fail to live up to the hype. Finally, a lack of international leadership means that worst-case sea level rise predictions come true – resulting in three feet of sea level rise by 2050.

## Clean and Green

Clean and Green is defined by an aggressive federal carbon tax to curb carbon dioxide emissions. This Future assumes the policy is implemented in the early 2020s and results in similar commitments worldwide. Consequently, clean technologies thrive. Driverless electric vehicles become nearly universal, with consumers preferring to share rides more frequently. Virtual reality enables more telecommuting and distributed workplace locations, particularly for higher-income individuals. Federal infrastructure investment enables the completion of high-speed rail lines across the country, including California High-Speed Rail. Yet with high taxes and burdensome regulations, jobs are increasingly automated, boosting productivity but resulting in fewer opportunities for workers without college degrees.

## Back to the Future

Back to the Future is defined by a thriving national economy supported by increased public investment in infrastructure, as well as immigration reform that increases the national population and workforce growth rate significantly. In the Bay Area, the technology sector thrives, leading to broad adoption of low-cost driverless vehicles. As a result, coastal metropolitan areas see a new wave of growth as technologies enable longer distance commuting to thriving urban job centers. Silicon Valley technologies remain dominant worldwide in everything from cars to e-commerce. Yet booming growth poses challenges for communities absorbing that growth and their aging infrastructure.

## Futures Analysis Round 1 | Status Quo Assessment

Each Future begins from the same 2015 starting point and integrates current conditions in the Bay Area. Current conditions include the composition of the Bay Area economy, the location of jobs and households, and the transportation network as it exists today. The three Futures include and maintain existing policies adopted by cities and other public agencies, such as today's urban growth boundaries and zoning. This first round of analysis on the three Futures also includes the strategies recommended in Plan Bay Area 2040 – the region's long-range transportation and land use plan adopted in 2017 – which go above and beyond existing adopted policies. These range from increases to development capacity in Priority Development Areas (places identified by Bay Area communities as areas for investment, new homes and job growth) to planned investments like East Bay Bus Rapid Transit (BRT).

In addition to the current conditions and Plan Bay Area 2040 strategies, three unique sets of external force assumptions were applied, based on the characteristics of the Future. MTC and ABAG's economic, land use and travel models then work together to project a set of key metrics about each Future in five-year increments, creating projections out to the year 2050.

Forecasted conditions were assessed for each Future in the year 2050 using MTC and ABAG's suite of modeling tools, understanding what the Bay Area would look like in each of the three futures under the status quo determined by Plan Bay Area 2040. The full set of findings stemming from this initial analysis can be found in the [Horizon Futures Opportunities and Challenges Report](#). These modeled future conditions provided a critical baseline against which a set of strategies could be evaluated in the next round of modeling work to determine how well each strategy performed.

## Futures Analysis Round 2 | Strategy Assessment

While past plans have focused largely on individual transportation investments and geographies for future growth, Plan Bay Area 2050 focuses on strategies as the core elements of the plan's recommendations. Plan Bay Area 2050 defines a strategy as a public policy or set of investments that can be implemented in the Bay Area at the city, county, regional or state level over the next 30 years. A strategy is not a near-term action, a mandate for a jurisdiction or agency, or a legislative proposal.

The strategies were sourced from the five Horizon Perspective Papers, and a more limited set of strategies were selected for analysis using MTC and ABAG's simulation models. After the status quo modeling of the three Futures concluded, a new round of modeling work was initiated to assess the impacts of the complete shortlist of strategies in each of the three Futures. While there was not enough time to allow for each strategy to be evaluated on its own, the model results did allow planners to understand how the full set of strategies affected key metrics related to a particular strategy, using the status quo modeling for each Future as a 2050 baseline. For example, Horizon assessed a strategy that provided free transit for low-income households. The difference in transit boardings by low-income riders between the status quo scenario and the scenario with all strategies applied was used as a metric to understand how that strategy worked in each of the three Futures.

The resulting analysis of strategy performance was used in a subsequent round of public and stakeholder engagement with the purpose of further narrowing down the list of strategies into the 25 strategies that comprised the Plan Bay Area 2050 Draft Blueprint. Strategies were also modified based on public feedback and the results of this analysis.

Futures Planning was the first of three rounds of iterative strategy modeling and revisions. After the Draft Blueprint was modeled, the list of strategies was expanded for the Final Blueprint, and strategies were modified to increase their impact or to better address priorities identified during public engagement.

For a full accounting of the findings of the strategy assessment through the Futures Planning effort, see the [Futures Final Report: Resilient and Equitable Strategies for the Bay Area's Future](#).

## Chapter 4 | Project Performance Assessment

For Plan Bay Area 2050 and the preceding two long-range planning cycles, MTC and ABAG have evaluated the performance of higher-cost, capacity-increasing transportation projects, including freeway expansions, transit expansions, and transit frequency boosts or other improvements within existing routes/right-of-way. Given the requirement that Plan Bay Area 2050 be fiscally constrained, the findings from Project Performance Assessment were critical in crafting the transportation strategies comprised of optimized packages of projects, allowing staff and partners to prioritize projects that were proven to perform well across three metrics described below in multiple sets of future conditions. The objectives of this assessment were three-fold:

- Understand how project benefits vary under different external conditions.
- Learn how the performance of projects could be enhanced through scope changes or new policy commitments.
- Start a collaborative dialogue with all stakeholders to prioritize projects for inclusion in Plan Bay Area 2050.

The methodology described in this chapter was developed with regular updates to the Regional Advisory Working Group and Regional Modeling Working Group, two bodies comprised of agency partners and advocacy organizations that meet monthly.

### Identifying Projects for Evaluation

Transportation projects were identified through three rounds of submission over the course of a full year between spring 2018 and spring 2019. The first round gathered submissions from partner agencies, including transit operators, county transportation agencies and the MTC Operations Section. This included 30 projects that were evaluated during Plan Bay Area 2040 but had evolved in scope and did not have full funding plans in place, alongside a few other projects that were assessed for the first time as part of Plan Bay Area 2050.

The second round was called the Request for Transformative Projects, wherein for the first time, MTC went beyond public sector partners to seek ideas directly from the public, private sector companies and nongovernmental organizations. MTC sought submissions to provide new and creative solutions for Bay Area transportation challenges – both capacity-increasing megaprojects that cost more than \$1 billion as well as lower cost operational strategies. MTC staff screened over 500 submissions for feasibility, potential benefits to the Bay Area, alignment with Horizon's Guiding Principles, creativity and consistency with minimum cost thresholds and shortlisted 35 ideas. A jury of transportation leaders from the public sector, non-profits and academia selected 12 ideas for evaluation – 6 capacity-increasing projects and 6 operational strategies. In addition, 36 ideas that were submitted by public sector agencies, including city governments, were all considered for evaluation.

Finally, MTC issued an official Request for Regionally Significant Projects to partner agencies to identify major projects below the \$1 billion threshold, receiving eight more project submissions to round out the suite of projects being evaluated through the Project Performance Assessment.

Apart from capacity-increasing projects and operational strategies, the assessment for the first time also considered seven resilience projects that would protect major freeway and transit infrastructure from sea-level rise. These project needs were identified during the Horizon phase. Staff also assessed seven concepts for new crossings of the San Francisco Bay, including rail alternatives, road alternatives, and combined road/rail alternatives.

Given the extensive list of projects to be evaluated, only projects with a combined capital and operations and maintenance cost through 2050 of \$250 million or greater in 2019 dollars were assessed for performance for Plan Bay Area 2050. Investments that were deemed to not increase road or transit capacity significantly were not evaluated, even if they exceeded the cost threshold of \$250 million, except for the six operational strategies selected from the Request for Transformative Projects.

Committed projects and programs, as defined by MTC Resolution No. 4182 were included in the Plan Bay Area 2050 baseline and did not go through Project Performance Assessment. Committed projects and programs include projects that were fully funded or had a certified environmental document when Project Performance Assessment began in summer 2018.

In total, 94 projects were evaluated. While the full list had 97 projects, three projects could not be effectively studied using the agencies' combined analytical tools. These included a project to regulate timing of freight delivery optimization and specific bicycle/pedestrian projects.

Figure 3. Number of projects evaluated in Project Performance Assessment by type

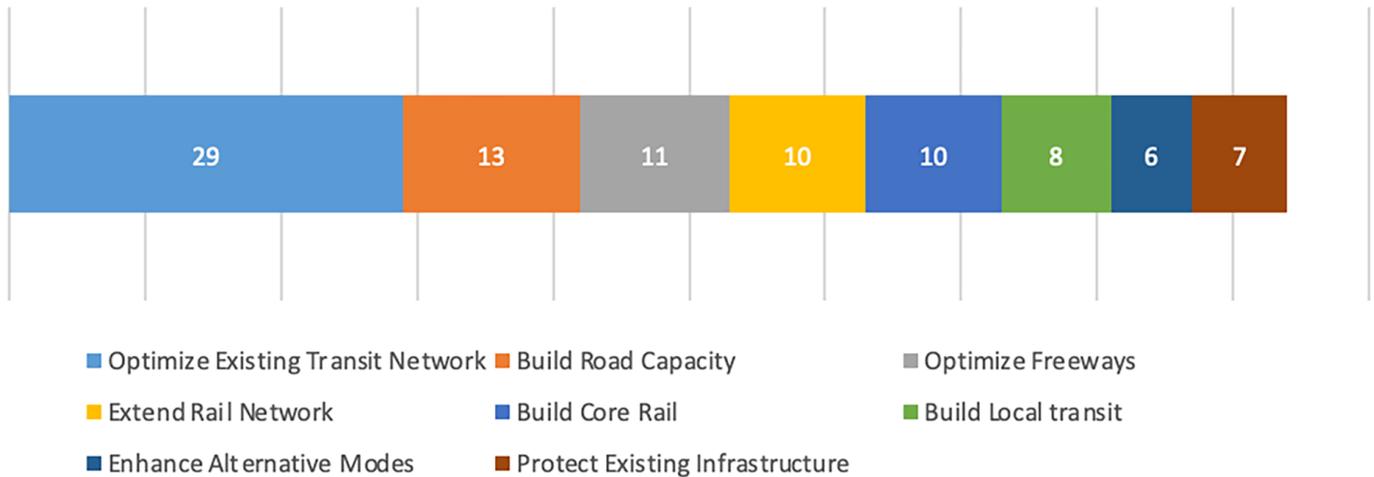
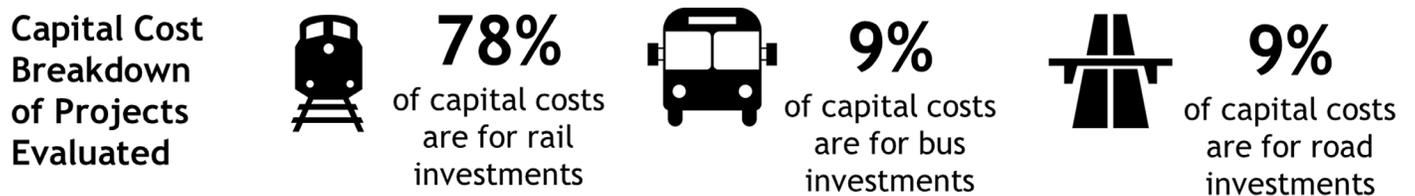


Figure 4. Capital cost breakdown of projects evaluated



Project Performance Assessment for Plan Bay Area 2050 evaluated each of the 94 projects individually through three assessments: Benefit-Cost Assessment, Equity Assessment and Guiding Principles Assessment. The methodologies for these assessments are detailed below, and more details can be found in Appendix 1. To assess whether projects are resilient to an uncertain future, each project was evaluated in each of the three Horizon Futures detailed in Chapter 3 of this report.

MTC acknowledges an important and valid critique of this assessment, that evaluating projects individually would not capture the synergy that is expected from complementary transportation investments. Similarly, the analysis does not capture the adverse impacts of advancing multiple projects that compete for the same user base, such as implementing multiple investments in the same corridor. The Futures Planning and Strategy Performance Assessment detailed in Chapter 3 addresses this critique by analyzing packages of projects along with complementary strategies. The Project Performance Assessment also evaluated a few project packages that included complementary projects, such as the new San Francisco-Oakland Transbay Rail Crossing, Megaregional Rail Project, and Regional Express Bus Network + Optimized Express Lane Network, and Integrated Transit Fare System and Seamless Transfers with Transit Capacity Expansion. Evaluating projects in the three Futures also shed light on how projects may perform under different conditions for land use and cost of driving. Nevertheless, given the regional significance and the size of the projects evaluated in this assessment, it is crucial to understand the individual performance of these projects and ensure that they can deliver sufficient benefits to the region on their own.

Details on the simulation modeling of projects, including new investments and approaches that were modeled for the first time such as per-mile tolling on freeways, transit fare integration and regional enhancements to the regional bicycle infrastructure network can be found in the Plan Bay Area 2050 Forecasting and Modeling Report. The projects evaluated in this assessment, it is crucial to understand the individual performance of these projects and ensure that they can deliver sufficient benefits to the region on their own.

Details on the simulation modeling of projects, including new investments and approaches that were modeled for the first time such as per-mile tolling on freeways, transit fare integration and regional enhancements to the regional bicycle infrastructure network can be found in the Plan Bay Area 2050 Forecasting and Modeling Report.

## Benefit-Cost Assessment

Used for the prior two cycles of Project Performance Assessment, Plan Bay Area 2050 evaluated projects for cost-effectiveness using their societal benefit-cost ratio (see Figure 5 for illustration). The benefit-cost ratio assessment leveraged Travel Model 1.5 to quantify benefits of transportation projects. Benefits (or disbenefits) of the project relative to a baseline no-project scenario were determined for each of the three Futures, reflecting differing external forces, growth forecasts, and land use patterns. As such, each project received three distinct benefit-cost ratio scores, one for each Future. Projects were considered cost-effective when the benefit-cost ratio is one, indicating that societal benefits and costs are roughly equal, or above one, indicating that benefits outweigh costs. Staff made several enhancements to the methodology, described briefly below and in detail in Appendix 1.

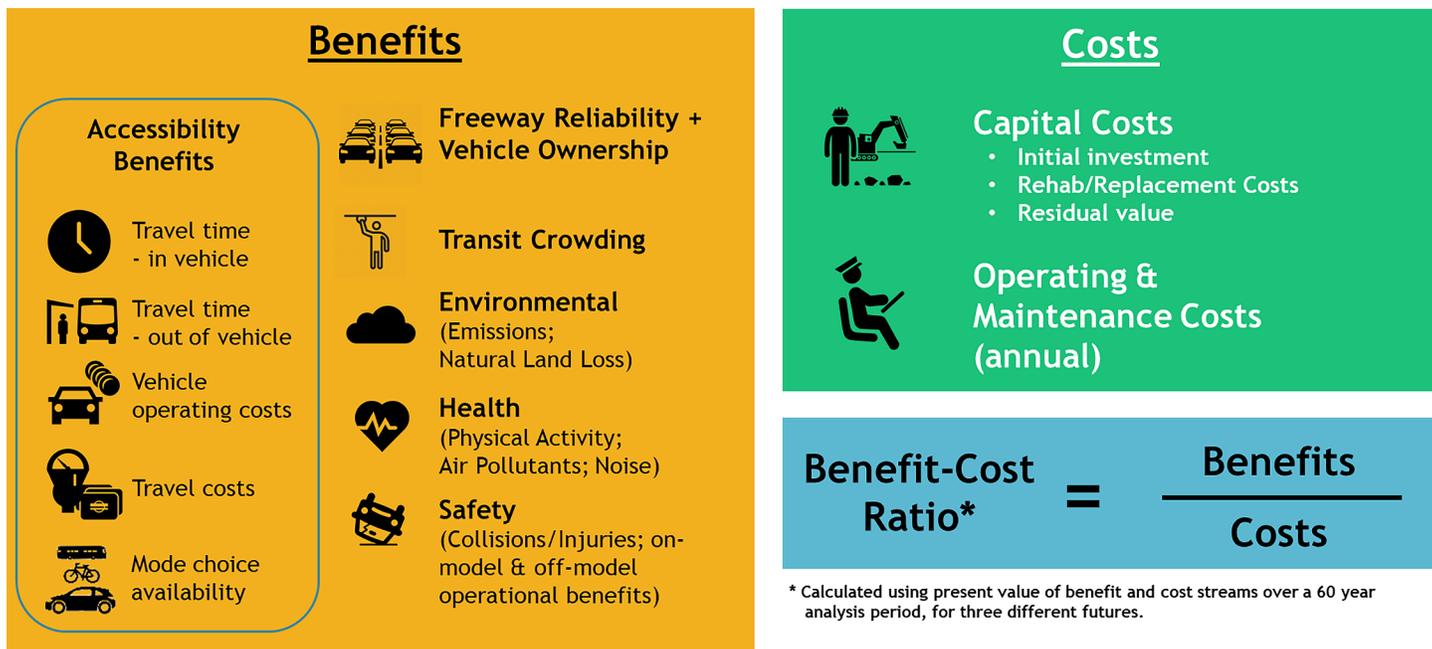
The following benefits and disbenefits were included in the calculation:

- **Accessibility Benefits:** in-vehicle and out-of-vehicle travel time, vehicle operating costs, travel costs, and mode choice availability
- **Freeway Reliability and Vehicle Ownership**
- **Transit Crowding**
- **Environmental:** Emissions and natural land loss
- **Health:** physical activity, air pollutants, and noise
- **Safety:** collisions/injuries and on-model and off-model operational benefits

The following costs were included in the calculation:

- **Capital Costs:** initial investment, asset rehabilitation and replacement costs, and residual value of the investment left over after the analysis period (2021-2080)
- **Operations and Maintenance Costs** (annual)

Figure 5. Project Performance Assessment: societal benefit-cost assessment components



## Benefit Updates Since Plan Bay Area 2040

- **Transit Crowding:** The change in transit crowding, either an increase or decrease, depending on the project, was calculated using an off-model methodology that is based on a “crowding penalty factor.” This factor is a multiplier of in-vehicle travel time, based on the load factor at a transit link level and the seated vehicle capacity. The multipliers were aligned with those used by peer agencies in Toronto, London and Los Angeles.
- **Safety:** Building on the approach used in Plan Bay Area 2040, benefits of specific operational improvements that were not previously captured, such as interchange or street design improvements, were estimated using crash reduction factors provided by FHWA.
- **Natural Lands:** Conversion of natural lands (e.g., wetlands, agricultural land) to infrastructure was included in the benefit calculation as the annual value of loss of goods, such as farm products and wood, and services, such as climate regulation and habitat provision, based on a per-acre value.

## Benefit Valuation Updates

- **Accessibility:** Similar to Plan Bay Area 2040, Project Performance Assessment used the travel model’s logsum outputs. Logsum is a metric that measures utility or consumer surplus, and captures mobility benefits (e.g., travel time savings, in-vehicle or out-of-vehicle), travel costs (e.g., tolls, fares, parking, vehicle operating), and the ease of which consumers reach destinations of their choice. These benefits collectively were termed as “accessibility benefits,” consistent with the estimation methodology. Logsums can be directly converted to hours and monetized using a consistent value of time for all income groups (acknowledging the implicit judgment that incremental accessibility is of the same value to all people).
- **Travel Time Reliability:** The valuation this cycle incorporates the latest research which indicates a slightly lower ratio against value of time is appropriate for motorists and a higher ratio is appropriate for freight, when compared to the Plan Bay Area 2040 valuations.
- **All Other Benefits:** All benefits not mentioned above and used in Plan Bay Area 2040 were carried over into Plan Bay Area 2050, with minor updates made to bring values in line with the latest available data.

## Cost Estimate Updates

- **Lifecycle Costs:** The cost denominator in the benefit-cost ratio of each project represents lifecycle costs in 2019 dollars, including initial capital investment costs (e.g., planning, design and environmental clearances), annual operations and maintenance costs, asset replacement costs over the analysis period and a residual asset value added back at the end of the analysis period (year 2080).
- **Cost Validation:** Costs of projects submitted by governmental agencies were reported by project sponsors, as was done in prior plans. An independent cost audit consultant validated the sponsor-provided cost estimates using a uniform cost calculation methodology. In the case of roughly 20 projects which had a disparity in cost estimates of over 30% between the sponsor-provided estimate and the consultant-calculated estimate, MTC staff discussed the costing with the project sponsor to arrive at a final cost. The consultant also developed cost estimates for project submissions from the public through the Request for Transformative Projects.
- **Transfers:** In line with best practices, transit revenues, tolls and parking fees were considered transfers that are neither a net economic benefit nor cost to society, resulting in their exclusion from the benefit-cost framework. This approach applies to both disbenefits and project costs.

## Benefit-Cost Ratio Calculation Methodology Updates

- **Benefit/Cost Streams and Present Value Approach:** Present values of a stream of benefits and costs were used to calculate the benefit-cost ratio, rather than using benefits and costs in the horizon year as was done in Plan Bay Area 2040. This approach captured advantages of quicker construction and implementation timelines, and long-term benefits of large investments. Forecasting streams of benefits and costs requires various assertions and assumptions that have been detailed in Appendix 1.

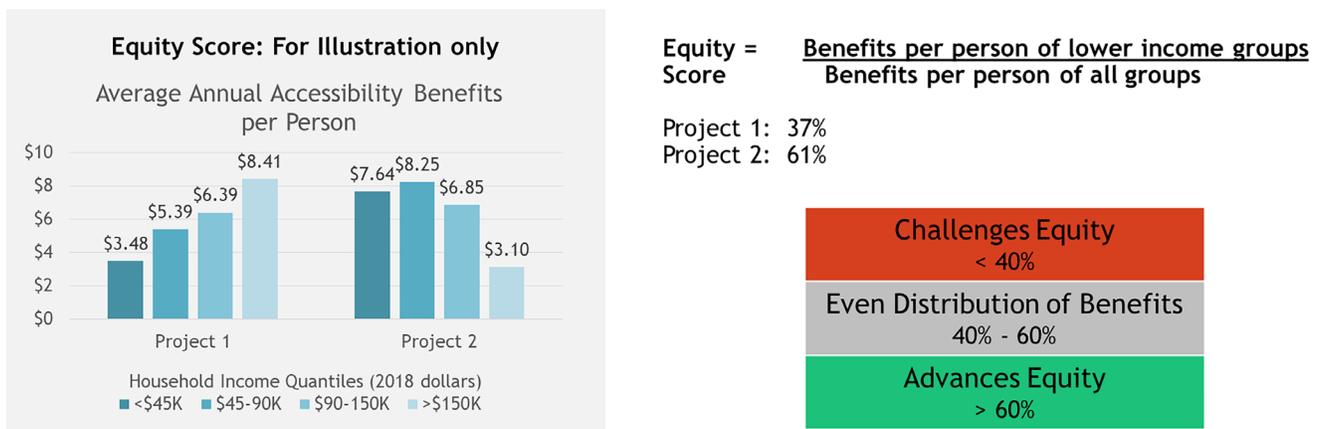
## Equity Assessment

A quantitative equity score was developed to lend insight into whether a project would advance equitable outcomes by providing a greater share of accessibility benefits to people with low incomes (see Figure 6). This calculation was performed for each of the futures, yielding three distinct equity scores. In contrast to the methodology used during Plan Bay Area 2040, which assessed whether a project provided an access point located physically within an Equity Priority Community (referred to as a Community of Concern prior to the May 2021 renaming), this new methodology uses quantitative travel model outputs to determine whether people with low incomes would actually derive utility from the project. The equity score calculates the ratio of the monetized accessibility benefit from the project experienced by a person with low income (defined in the model as a person with annual household income of less than \$100,000 in 2019 dollars) relative to the average accessibility benefit experienced by a Bay Area resident.

A project could receive one of three equity scores based on the quantitative ratio calculated using model outputs:

- **Advances Equity:** Ratio is over 60%
- **Even Distribution of Benefits:** Ratio between 40 and 60%
- **Challenges Equity:** Ratio is less than 40%

Figure 6. Project Performance Assessment: equity score methodology



## Guiding Principles Assessment

The Guiding Principles Assessment is a flag-based assessment that relies solely on qualitative criteria and seeks to ensure that projects align with the five Guiding Principles of Plan Bay Area 2050. Specific evaluation questions were defined to evaluate projects against each Guiding Principle, focusing on significant negative impacts associated with the project implementation (Table 1). Staff integrated feedback that was received during the June 2019 RAWG and August 2019 RAWG meetings, including clarifying the evaluation questions. A project received a flag if it did not support a Guiding Principle. No project received more than two flags.

**Table 2.** Framework for Guiding Principles Assessment

GUIDING PRINCIPLE	EVALUATION QUESTION	APPLICATION OF EVALUATION QUESTION
 <p><b>AFFORDABLE</b></p>	<p>If yes, the project is not supportive of the Guiding Principle</p> <p>Does the project increase travel costs for residents with lower incomes?</p>	<p>For a project to be flagged as not supportive of the Guiding Principle...</p> <ul style="list-style-type: none"> <li>The project would have to actively eliminate a lower-cost travel alternative, rather than just offering a new travel option.</li> </ul>
 <p><b>CONNECTED</b></p>	<p>Does the project increase travel times or eliminate travel options?</p>	<ul style="list-style-type: none"> <li>The project would have to increase travel time for one mode without decreasing it for another mode; exceptions would be made for projects with significant safety benefits that justify increased travel times, or...</li> <li>... the project would have to eliminate a modal option from a travel corridor.</li> </ul>
 <p><b>DIVERSE</b></p>	<p>Does the project displace residents with lower incomes or divide communities?</p>	<ul style="list-style-type: none"> <li>The project would have to directly displace households with lower incomes through site acquisitions or...</li> <li>The project would have to build an elevated freeway structure through an existing neighborhood.</li> </ul>
 <p><b>HEALTHY</b></p>	<p>Does the project significantly increase emissions or collisions?</p>	<ul style="list-style-type: none"> <li>The project would have to yield a significant long-term net increase in emissions and/or collisions.</li> </ul>
 <p><b>VIBRANT</b></p>	<p>Does the project eliminate jobs?</p>	<ul style="list-style-type: none"> <li>The project would have to directly result in a net reduction of jobs.<sup>1</sup></li> </ul>

<sup>1</sup> Threshold of -100 homes impacted or -100 jobs impacted

# Findings

MTC and ABAG staff produced a synthesis of findings at the conclusion of the Project Performance Assessment process, which were shared with MTC and ABAG committees and working groups in February 2019. Detailed tables with benefit-cost ratios and equity scores across the three Futures and the Guiding Principles-based flags assessment for each project evaluated can be found in Appendix 2. The results also feature a breakdown of forecasted lifecycle benefits and costs of the projects.

Among the 94 projects evaluated, only three projects were determined to be cost-effective and advance equitable outcomes in all Futures, without any Guiding Principle flags – two versions of the Integrated Transit Fare System with Transit Capacity Expansion (one with and one without Seamless Transfers), and Enhanced Regionwide Bicycle Infrastructure. An additional eighteen projects were found to be cost-effective in at least two Futures and not challenge equity in any Future while having zero Guiding Principle flags. Quick summaries of each assessment are presented below:

## Benefit-Cost Assessment

Seventeen projects had a benefit-cost ratio greater than one in all three Futures, while eighteen projects had a ratio greater than one in at least two Futures – most of these able to feature strong performance only in the two high-growth Futures: Clean and Green and Back to the Future. Thirty-nine projects had a benefit-cost ratio less than one in all Futures.

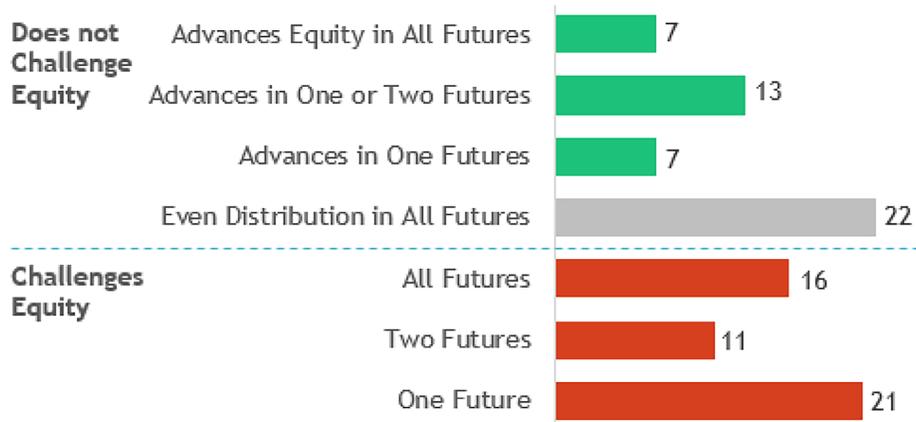
Figure 7. Summary of Benefit-Cost Assessment



## Equity Assessment

Seven projects were found to advance equity in all three Futures, and thirteen projects advanced equity in at least two Futures. On the other hand, sixteen projects challenged equity in all Futures, and eleven projects challenged equity in at least two Futures. Twenty-two projects were found to have even distribution of benefits in at least two Futures, while not challenging equity in any Future.

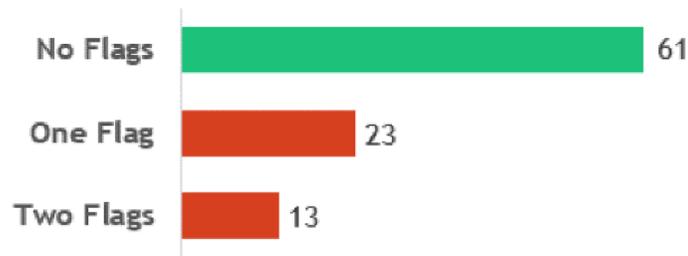
Figure 8. Summary of Equity Assessment



## Guiding Principles Assessment

Sixty-one projects did not receive any flags. Twenty-three projects received one flag, and thirteen projects received two flags. No project received more than two flags. Among the flags, fifteen were for Healthy, fourteen were for Vibrant, ten were for Diverse, nine were for Affordable, and one was for Connected.

Figure 9. Summary of Guiding Principles Flag Assessment



A shortlist of the 10 transportation projects that were cost-effective and advanced equity in multiple futures without receiving any Guiding Principles flags were included in the Draft Blueprint under the strategy Advance Low-Cost Transit Projects. These projects tended to be low-cost improvements to local transit, such as frequency boosts or bus rapid transit infrastructure. Improvements to the high-ridership BART system also performed well and were included. A new Transbay rail crossing was modeled as well under the Draft Blueprint strategy to Build a New Transbay Rail Crossing. The Draft Blueprint did not include any road projects, due to the fact that those projects tended to have lower-performing equity and cost-effectiveness scores. The Draft Blueprint also included transportation projects studied in Project Performance Assessment that protected vulnerable road and rail assets from closure due to inundation.

Including this highly focused set of transportation projects in the Draft Blueprint provided more time for sponsors and MTC to work together on finalizing the transportation project list, leveraging the findings from Project Performance Assessment to arrive at sponsor commitments to improve projects, described in the Commitment Letter Process section below.

Table 3. Draft Blueprint transportation projects

PPA ID	PROJECT	START YEAR
2201	BART Core Capacity	2028
2205	BART to Silicon Valley Phase 2	2026
2209	Irvington BART	2026
2007	San Francisco South East Waterfront Transit Improvements	2035
2003	Muni Forward	Various
2100	San Pablo BRT	2027
2008	Alameda Point Transit Network	2020
2000	AC Transit Local Service Increase	2020
2105	E 14th/Mission Multimodal Corridor	2025
3001	Treasure Island Congestion Pricing	2035
N/A	New Transbay Rail Crossing	2050

Nine synthesized findings described in detail below summarize the results of the project-level performance assessment.

**Finding 1: Project costs have increased substantially since Plan Bay Area 2040.**

Not only have existing megaprojects evaluated in past cycles of Plan Bay Area grown more expensive, but bold new ideas to address the region's deep-seated challenges are increasingly expensive. The total capital cost of all projects evaluated exceeded \$400 billion, relative to less than \$100 billion in Plan Bay Area 2040. New ideas for regional reforms to speed project delivery and manage capital and operations and maintenance costs are essential for meeting the region's needs.

**Finding 2: Project performance will be significantly affected by uncertain future conditions.**

While the use of the three Futures to assess the performance of projects across a variety of future conditions helped to shed light on the resilience of projects to uncertainty, it is clear that projects will perform differently based on differing future conditions that either help or hurt performance. For a majority of the projects evaluated, especially those that have high costs and are capital intensive, project benefits outweighed their costs only in the Futures that featured more robust regional growth: Clean and Green and Back to the Future. Complementary strategies studied throughout the Horizon and Plan Bay Area 2050 processes can help mitigate uncertainty around future ridership under varying population growth levels. Such strategies include enhanced land use near new transit stations or pricing strategies that boost demand for transit while helping curb greenhouse gas emissions.

**Finding 3: Lower-cost improvements, such as urban BRT lines and sea level rise protections for heavily used freeways, are the best bet in an uncertain future.**

Projects in these two buckets consistently had strong performance across multiple Futures across all three assessments. Generally, transit projects performed well in both the more transit-friendly Clean and Green and the more auto-friendly Back to The Future – highlighting their resilience and the potential to perform even better if complemented with the right strategies. Road expansion projects, on the other hand, performed well when future conditions suited driving. All of the bus rapid transit and sea level rise mitigation projects that were studied in Project Performance Assessment were included in Plan Bay Area 2050, and future plans should consider a wider range of such investments given their resilience to uncertainty and potential to advance equity by improving mobility options that tend to be used by individuals with lower incomes.

**Finding 4: High-cost commuter rail projects have mixed performance outcomes, predominantly benefitting higher-income groups.**

Roughly twenty projects extending or enhancing commuter rail service were evaluated, including Caltrain, SMART, ACE Rail, and Capitol Corridor service. Many of these projects had benefit-cost ratios below one, indicating costs exceeded benefits, with the exception of a New San Francisco-Oakland Transbay Rail Crossing, new Valley Link rail service, and ACE Rail Service Increase (all three performed well only in the two high-growth Futures). Furthermore, given the locations they serve and the high fares in some cases, most commuter rail project accessibility benefits skewed toward riders with higher incomes. Adoption of complementary fare policy and land use strategies are critical towards enhancing equitable outcomes with these large investments, making them more accessible to users of all incomes. By providing high-capacity and high-frequency transit to major employment centers, these projects can play a critical role in enhancing economic mobility for populations with low and middle incomes.

**Finding 5: Some projects have synergies, while other projects compete with one another.**

Given that there is limited funding available to implement projects within the region, it is critical to consider which projects compete for riders and which projects are mutually beneficial. The Megaregional Rail project provided insight that complementing rail investments can boost boardings by up to 30% in some corridors. Caltrain High Growth, which significantly expands capacity on the Caltrain corridor, has a benefit-cost ratio above 1 only when connected with a New San Francisco-Oakland Transbay Rail Crossing. Regional Express Lanes or HOV lanes, when they are a contiguous network, performed better when complemented with per-mile fees for single-occupancy vehicles and diminished equity concerns when paired with demand-based means-based tolls. On the other hand, freeway interchange projects that attempt to alleviate bottlenecks may be trying to solve the same problems that transit projects seek to address. Transit end-of-line extensions, for example, BART extensions to Hercules or Cupertino, may increase crowding elsewhere in the system unless complementary service increases are included. Regional express bus services, while in some cases may help alleviate crowding and also provide cheaper alternatives to rail transit,

can compete with parallel transit services reducing their cost effectiveness. The corridors where high-frequency express buses promised significant ridership and/or alleviated crowding in existing transit were Downtown/East Oakland to SF/West SF/SFO, and Richmond/Berkeley/Oakland to Silicon Valley/Diridon.

**Finding 6: Road pricing is the most effective tool to manage auto congestion on freeways – but it must be done in an equitable manner.**

Freeway congestion is a major challenge to quality of life in the Bay Area today, and it will very likely be a challenge in the future as well with a growing population. Among all the projects evaluated (including Free Transit, a New San Francisco-Oakland Transbay Rail Crossing, Megaregional Rail Network modernization and expansion, and full buildout of the Regional Express Lane Network along with a robust express bus network), the per-mile freeway tolling strategy was the most effective at managing congestion and curbing VMT and GHG emissions, even with means-based and carpooling discounts in place. The freeway pricing strategy prevented a 20% to 30% rise in travel times on freeways while enhancing transit ridership and had a greater impact on reducing GHG emissions than all of transit projects included in Plan Bay Area 2050, totaling more than \$100 billion in costs. However, road pricing challenges equitable outcomes when mitigations and complementary transit and last-mile strategies are not in place, and revenues are not reinvested toward enhancing transportation alternatives. Further, as learned during the Futures Planning process, pairing road pricing with strategies such as lower speed limits on arterials lowers the risk of traffic overflow onto parallel local roads.

**Finding 7: Transit fare reform can boost ridership and advance equitable outcomes.**

The project to reform the Bay Area's complex fare system with a uniform fare structure significantly boosted transit ridership (3% to 7% increase across Futures) and was the second most effective project in shifting commute mode share to transit (after Free Transit). Furthermore, the project resulted in net fare revenue growth in the long term and enhanced the benefit-cost and equity performance of capacity expansion projects. The analysis indicated that such fare reform would need to be complemented with increased transit service to meet the rise in demand, but it can help shift the benefits of projects toward people with lower incomes, particularly investments that improve service on commuter rail and express bus routes that have higher fares than local bus or light rail. Free Transit, while being the most effective project evaluated in increasing transit boardings, would surge transit demand (by 50% to 60%) to an extent well beyond the existing system capacity and create significant financial challenges for transit operators, particularly those with a high reliance on fares to fund operations.

**Finding 8: Greater investment in micromobility can have significant regional benefits for the overall transportation network.**

Investments that expand the region's bicycle infrastructure, including off-street multi-use trails and protected bicycle lanes, proved to be highly cost-effective and equitable, resulting in higher active mode shares and greater accessibility for residents with lower incomes. Modeling of this project showed immense benefit to the transportation network, including drivers and transit vehicles, as road congestion lowers with more people shifting from cars to bicycling. Micromobility investments would have additional benefits not captured in the model results, such as improved access to transit stations. Acknowledging that bicycles may only be used by a fraction of the population, Plan Bay Area 2050 invests significantly in improving pedestrian infrastructure as well, though the investments cannot currently be represented in the travel model.

**Finding 9: A new San Francisco-Oakland Transbay rail crossing emerged as the most cost-effective transit expansion megaproject.**

Several variations of new Transbay crossings were evaluated, between San Francisco and Oakland as well as farther north and farther south. A Perspective Paper titled Crossings was produced by MTC and ABAG as part of the Horizon initiative, building on the Project Performance Assessment findings. Among all the crossings studied, and other megaprojects, new Transbay rail service between San Francisco and Oakland, regardless of whether service would be provided by BART or traditional commuter rail such as Caltrain, was most cost-effective and equitable. Despite the high cost of the project, the benefits outweigh the costs in both the high-growth Futures. The project promised to deliver strong accessibility benefits, alleviate existing and future transit crowding, and provide redundancy in the most congested corridor in the Bay Area. While not captured within the Project Performance Assessment modeling, such a project would have strong potential to support focused housing development and boost economic growth.

## Commitment Letter Process

The three metrics used for Project Performance Assessment – benefit-cost ratio (in three Futures), equity score (in three Futures), and number of Guiding Principle flags (across Futures) – were used to assess a project’s competitiveness for regional discretionary funding to bridge the gap between the total project cost and the funding available from existing sources for county-controlled discretionary budgets within the Plan Bay Area 2050 fiscally-constrained project list. Projects that had strong performance in multiple Futures across all three metrics were considered to be resilient to uncertainty and equitable, and therefore strong candidates for regional discretionary funding support to ensure that the project was included in the project list. More information about the projects that were included in the fiscally constrained project list can be found in the Plan Bay Area 2050 Transportation Project List.

In past iterations of Plan Bay Area, a limited number of projects were considered “high performers” based on their Project Performance Assessment results and therefore prioritized for regional discretionary funding. Plan Bay Area 2050 took a more collaborative approach to utilizing Project Performance Assessment results, allowing project sponsors to submit a commitment letter detailing the sponsor’s commitments to improving the performance of their project. Projects that met one or more of the following criteria were deemed to have performance challenges and invited to submit a commitment letter to MTC and ABAG.

**Table 4.** Summary of performance deficiencies

PERFORMANCE DEFICIENCY	NUMBER OF PROJECTS
Two or more benefit-cost ratios less than one	77
One or more equity scores with a “Challenges” rating	48
One or more Guiding Principles flags	36

To be eligible for regional discretionary monies, project sponsors were invited to describe agreed-upon performance actions or “commitments” to address performance challenges via a commitment letter, approved by the project sponsor’s board. Sponsors had discretion over which actions they chose to include in their letters, leveraging their familiarity with the project and local context. Examples of commitments include changes to project scope (such as proposing a phase 1 of a project that focuses on the areas with the greatest forecasted benefits) or support for complementary regional strategies (such as transit fare reform or higher densities in Growth Geographies adjacent to the proposed project).

**Table 5.** Example performance commitments received

PROJECT NAME	SPONSOR	PERFORMANCE CHALLENGE(S)*	COMMITMENTS
AC Transit Rapid Network	AC Transit	Benefit-Cost Ratio	Reduce scope to focus on low-cost capital improvements and a limited number of routes
AC Transit Transbay Service Frequency Increase	AC Transit	Equity	Reduce scope to focus on low-cost capital improvements and a limited number of routes
ACE 10 Daily Round Trips	Altamont Corridor Express	Equity	Support for regional fare integration and means-based discounts
Bay Area Forward	MTC Design and Project Delivery	Equity, Guiding Principles	Focus on investments that benefit transit
Caltrain Downtown Extension	SFCTA	Benefit-Cost Ratio, Equity	Continue Downtown Congestion Pricing study
Caltrain Full Electrification and Blended Baseline	Caltrain and California High-Speed Rail Authority	Benefit-Cost Ratio, Equity	Reduce scope to focus on increasing frequencies to 8 trains per hour per direction, which can be supported with minimal capital investment
Downtown San Francisco Congestion Pricing	SFCTA	Equity, Guiding Principles	Explore means-based fares
Downtown San Jose Subway (renamed Light Rail Modernization and Grade Separation in Final Blueprint)	City of San Jose	Benefit-Cost Ratio	Support for transit-supportive land use in Growth Geographies along corridor
Dumbarton Rail	SamTrans	Benefit-Cost Ratio, Equity	Reduce scope to explore lower-cost, lower-capacity Group Rapid Transit instead of commuter rail; support for transit-supportive land use in Growth Geographies along the corridor; commitment to mitigate natural land loss from project implementation
East-West Connector (renamed Quarry Lakes Parkway in Final Blueprint)	ACTC	Guiding Principles	Addition of multi-use path to improve safety outcomes
Geary BRT Phase 2	SFCTA	Equity	Support SFMTA Muni Equity Strategy
I-80/I-680/SR-12 Interchange	STA		Support for investing in transit and managed lanes
Regional Express Bus (ReX)	MTC	Benefit-Cost Ratio, Equity, Guiding Principles	Reduce scope to remove some capital improvements and limit routes to highest ridership routes Support for means-based fares

PROJECT NAME	SPONSOR	PERFORMANCE CHALLENGE(S)*	COMMITMENTS
Regional Express Lanes Network	MTC	Benefit-Cost Ratio, Equity, Guiding Principles	Prioritize conversions of HOV lanes or general-purpose lanes for Express Lane construction, where possible Support for means-based discounts on Express Lanes and in other future pricing efforts
Resilient SR-37	NVTA, SCTA, STA, TAM	Equity, Guiding Principles	Support for means-based toll discounts and transit/bike connections on the corridor
San Jose Airport People Mover	City of San Jose	Benefit-Cost Ratio, Equity	Support for transit-supportive land use in Growth Geographies along corridor
SR-262 Mission Boulevard Improvements	ACTC	Benefit-Cost Ratio, Equity, Guiding Principles	Reduce scope to focus on improvements to arterial, eliminating Express Lane direct connector between I-880 and I-680
BART to Cupertino (renamed Stevens Creek Rail Line in Final Blueprint)	City of San Jose	Benefit-Cost Ratio	Reduce scope to study lower cost light-rail line instead of BART
Treasure Island Congestion Pricing	SFCTA	Equity, Guiding Principles	Exempt low-income current Treasure Island residents from toll

While projects were not modeled again with the commitments in place, the commitments did enable MTC and ABAG staff to make a qualitative assessment of the extent to which the commitments would address the project’s deficiencies. This information guided the assignment of regional discretionary revenues in the final transportation project list.

Projects with performance deficiencies that did not submit a commitment letter, or for which commitments were not seen as adequate to address the challenges of the project, were still eligible for inclusion in Plan Bay Area 2050 if the project did not require regional discretionary monies to achieve fully funded status. Several projects with deficiencies did not submit commitment letters, with sponsors funding the projects exclusively through their county-controlled budgets within the Plan Bay Area 2050 project list process.

The full list of commitment letters is included as Appendix 3 of this report.

# Confidence Assessment

The Confidence Assessment describes limitations in the Project Performance Assessment that arise from modeling inadequacies or deficiencies in the evaluation framework. Disclosure of these limitations is intended to provide transparency and capture concerns that have been raised by stakeholders during the assessment. The first section describes overarching confidence considerations that extend over all projects or some project types. The second section describes limitations specific to each project. The full Project Performance Assessment Confidence Assessment is included as Appendix 4 of this report.

## Overarching Confidence Considerations

### External Forces

Each project is evaluated against three different Futures. Such evaluation lends insight into performance and resiliency of projects under different future conditions that may be driven by external forces. Rising Tides Falling Fortunes is a low-growth future with a cost of driving similar to today and autonomous vehicle and electric vehicle market penetration not very far from today's levels. Clean and Green and Back to the Future are both high-growth Futures, the former generally being a more transit-supportive future with a high cost of driving, denser urban land use patterns and dispersed job centers, and the latter being a more auto-supportive Future with a low cost of driving, dispersed housing patterns and urban job centers. In both these Futures, autonomous vehicle and electric vehicle technologies have significantly evolved. All three Futures were purposefully framed as divergent realities through a collaborative process with stakeholders. More information regarding the Futures can be found on the MTC website. While the assessment intends to capture the resiliency of projects to such divergent future conditions, it acknowledges that projects may perform differently (better or worse) in part as a result of the external forces that define the Futures.

### Land Use Pattern

Each Future is associated with its own land use pattern, and so projects are evaluated against three different land use patterns. While the three land use patterns are divergent, growth in all the Futures is based primarily on the Priority Development Area (PDA) framework from Plan Bay Area 2040. Further information on PDAs can be found on the MTC [website](#). Consequently, this assessment assumes significant growth in jurisdictions that have nominated themselves as PDAs, for example, along transit corridors. Importantly, Plan Bay Area 2050's Growth Geographies extend beyond locally-nominated PDAs to consider more housing and job growth in Transit-Rich Areas and High-Resource Areas.

### Transportation-Land Use Interaction

Transportation projects such as commuter rail or BRT projects can have significant impacts on surrounding land use in the short and long term. This land use change can enable further change in transportation patterns, also known as induced demand. However, due to modeling time and resource constraints, the assessment does not evaluate land use impact at a project level. Induced demand of transportation projects is captured to the extent that people may choose different housing or job locations given the availability of transportation infrastructure; however, change in the physical location of housing stock and office space as result of the project itself is not captured. This may lead to the underestimation of benefits for some projects.

### Project Interaction

Projects were evaluated individually to understand their impact and to be able to compare all projects uniformly. This is essential to understand given the fiscal constraint of the plan. However, projects serving related travel markets could, if evaluated as a package, increase or decrease the benefits of an individual project. For example, expanded local feeder bus service may increase the projected ridership and benefits of commuter rail projects, while expanding a freeway and building a new transit line in the same corridor may cause the improvements' combined benefits to be lower than sum of individual benefits. A handful of projects were evaluated as packages, such as the San Francisco-Oakland Transbay Rail Crossing projects and the Megaregional Rail project. While these projects did highlight complementary benefits of investments, the individual project evaluation helps identify the weaker performing projects. Further, the [Futures Planning analysis](#), the Draft Blueprint and the Final Blueprint all evaluate a package of strategies and investments, yielding more nuanced insights into complementary benefits of projects and policies.

## Unconstrained Transit Capacity

Travel Model 1.5 does not constrain transit capacity, and hence ridership on transit is a representation of unconstrained demand on that transit. While this may lead to overestimation of benefits for transit projects, the impact is mitigated by the off-model transit crowding calculation, which would result in crowding disbenefits for the project. Similarly, Travel Model 1.5 also does not constrain parking capacity at park-and-ride stations. Again, this may lead to overestimation of benefits for projects with park-and-ride facilities such as BART and commuter rail. However, the impact would be mitigated by the off-model transit crowding disbenefits.

## Transit Reliability

Regional activity-based models such as Travel Model 1.5 forecast a typical weekday in the horizon year. As such, it is not feasible with the current model to capture benefits to the reliability of transit from improvements such as dedicated lanes for buses, grade separations or system-wide improvements to transit operations. While improvements in travel time from such improvements would be captured, improved reliability such as better on-time performance is not captured. This limitation may result in underestimating project benefits and is referenced for specific projects in the next section.

## Grade Separations

While Travel Model 1.5 captures the benefit from decreased travel time due to grade separations and the off-model crash reduction factor methodology captures associated decrease in collisions, the evaluation does not capture any potential improvements in traffic circulation, pedestrian/bike access and transit reliability because of the grade separations. This limitation may result in underestimating project benefits and is referenced for specific projects in the next section.

## Note on Land Values and Other Economic Benefits

While economic benefits such as land values and job agglomeration can be significant, especially in the case of rail projects and in urban downtown locations, such benefits are not within the scope of societal benefit-cost analyses. Estimating such benefits would necessitate a separate economic benefit-cost analysis.

## Project-Specific Confidence Considerations

An evaluation of circumstances unique to each project is included in Appendix 4. The two criteria used for this assessment are listed below:

### 1. Travel Model Accuracy

- Does the travel model have limitations in understanding a particular type of travel behavior (e.g., weaving)?
- Does the travel model have limitations in understanding travel patterns due to the nature or location of the project (e.g., new mode such as gondola, projects at periphery of the region)?
- Does the travel model lack an understanding of smaller-scale project travel changes relative to the region (e.g., single infill station)?

### 2. Framework Completeness

- Does the travel model output capture all the primary benefits of the project (e.g., transit reliability, or redundancy)?

## Sensitivity Assessment

Past iterations of Project Performance Assessment documentation have included sensitivity testing summaries, demonstrating how benefit valuations included in the estimate of cost-effectiveness changed when key components of the benefit-cost calculation were modified. Using three Futures with differing external forces accomplished the same objective by assessing the benefit-cost ratios for a project under three differing future conditions. As such, this report does not include a separate sensitivity assessment.

# Chapter 5 | Plan Bay Area 2050 Equity and Performance Outcomes

## Framework

The framework used to measure outcomes of the Plan is centered on the Plan Bay Area 2050 Vision and Guiding Principles. Each Guiding Principle is supported by two key questions that delve into the impacts that the Plan has on the corresponding Guiding Principle, shown in

Table 5 below. Outcomes are characterized by several performance measures or metrics, shown in Table 6. Metrics summarize the performance of the 2015 baseline and 2050 conditions for the Plan, two additional EIR Alternatives, and a No Project scenario.

Outcomes are presented using an equity lens, wherein each performance measure is presented for all households and households with low incomes or households that reside in Equity Priority Communities, where feasible. The last column in Table 6 indicates whether the metrics are disaggregated. “Pop” indicates that metrics are determined for different population groups (i.e., Households with Low Incomes vs. All Households). “Geo” indicates that metrics are determined for different geographies (i.e., Equity Priority Community vs. Region). Some metrics do not lend themselves to such disparate impact comparisons and are indicated by “n/a.” Where applicable, performance is also reported for the Plan Bay Area 2050 Growth Geographies as a whole and/or specific types of Growth Geographies, such as High-Resource Areas or Transit-Rich Areas.

It is essential to note that metrics to describe outcomes and disparities can be insightful in understanding the impacts of the Plan, but not every aspect of every Plan strategy can be simulated or captured in metrics. For a full description of the Plan strategies, refer to the Plan Bay Area 2050 Plan Document. For detailed tables on equity-focused components with Plan strategies, refer to the Plan Bay Area 2050 Equity Analysis Report.

**Table 6.** Framework to describe Plan Bay Area 2050 equity and performance outcomes

GUIDING PRINCIPLE	QUESTION
 <b>AFFORDABLE</b>	<ul style="list-style-type: none"> <li>• Will Bay Area residents spend less on housing and transportation?</li> <li>• Will the Bay Area produce and preserve more affordable housing?</li> </ul>
 <b>CONNECTED</b>	<ul style="list-style-type: none"> <li>• Will Bay Area residents be able to access their destinations more easily?</li> <li>• Will Bay Area residents have a transportation system they can rely on?</li> </ul>
 <b>DIVERSE</b>	<ul style="list-style-type: none"> <li>• Will Bay Area communities be more inclusive, providing greater access to opportunity for disadvantaged populations?</li> <li>• Will Bay Area residents be able to stay in place?</li> </ul>
 <b>HEALTHY</b>	<ul style="list-style-type: none"> <li>• Will Bay Area residents be healthier and safer?</li> <li>• Will the environment of the Bay Area be healthier and safer?</li> </ul>
 <b>VIBRANT</b>	<ul style="list-style-type: none"> <li>• Will jobs and housing in the Bay Area be more evenly distributed?</li> <li>• Will the Bay Area economy thrive?</li> </ul>

Table 7. Plan Bay Area 2050 equity and performance metrics

GUIDING PRINCIPLE	QUESTION	PERFORMANCE MEASURE	DATA SOURCE*	DISPARATE IMPACTS?
 <b>AFFORDABLE</b>	Will Bay Area residents spend less on housing and transportation?	Housing and transportation costs as a share of household income	MTC/ABAG Housing cost burden calculator	Pop
		Average transportation expenses per trip (fare, out-of-pocket auto costs, parking costs, tolls)	UrbanSim / TM	Pop
	Will the Bay Area produce and preserve more affordable housing?	Share of housing that is deed-restricted affordable	UrbanSim	Geo
		Share of new housing production that is deed-restricted affordable	UrbanSim	Geo
		Share of at-risk affordable housing preserved as permanently affordable	Off-model / CHPC database	n/a
 <b>CONNECTED</b>	Will Bay Area residents be able to access their destinations more easily?	Number and share of total jobs that are accessible by:	TM	Geo
		<ul style="list-style-type: none"> <li>• 30 min auto</li> <li>• 45 min transit</li> <li>• 20 min bike</li> <li>• 20 min walk</li> </ul>		
		Share of households located near high-frequency transit (0.5 mi)		
		Share of jobs located near high-frequency transit (0.5 mi)	UrbanSim / GIS analysis	Job industry
	Will Bay Area residents have a transportation system they can rely on?	Freeway corridor peak-hour travel time (minutes)	TM	n/a
		Percent of person hours in transit spent in crowded conditions, by transit operator	TM	n/a
Share of transit assets that are not in a state of good repair		Transportation Element	n/a	
 <b>DIVERSE</b>	Will Bay Area communities be more inclusive?	Share of households that are households with low incomes	UrbanSim	Geo
		Homeownership rate for households with low incomes	Off-model / ACS	n/a
	Will Bay Area residents be able to stay in place?	Share of neighborhoods (census tracts) that experience loss in households with low incomes over plan period	UrbanSim / GIS analysis	Geo

GUIDING PRINCIPLE	QUESTION	PERFORMANCE MEASURE	DATA SOURCE*	DISPARATE IMPACTS?
 <b>HEALTHY</b>	Will Bay Area residents be healthier and safer?	Share of households in risk prone areas that are protected from risk: <ul style="list-style-type: none"> <li>• Sea level rise/flooding risk</li> <li>• Earthquake risk</li> <li>• Wildfire risk</li> </ul>	UrbanSim, GIS Analysis with MTC Hazard Map	Geo
		Reduction in building risk exposure to damage from earthquake or wildfire	Off-model	n/a
		Annual road fatalities/serious injuries per 100,000 residents	TM	n/a
		Daily PM <sub>2.5</sub> emissions	TM/EMFAC	n/a
		Parks and trails per thousand residents	Off-model	Geo
 <b>VIBRANT</b>	Will jobs and housing in the Bay Area be more evenly distributed?	Jobs-housing ratio	UrbanSim	n/a
		Mean one-way commute distance	TM	Pop
		Jobs-housing ratio	UrbanSim	n/a
 <b>VIBRANT</b>	Will the Bay Area economy thrive?	Growth in GRP per capita (2020 dollars) between 2015-2050	REMI	n/a
		Job growth by industry wage level	REMI	Industry wage level

\*NOTE: Travel Model is represented as TM. California Housing Partnership Coalition data is represented as CPHC. California Emission FACTor model is represented as EMFAC. Regional Economic Models, Inc. model is represented as REMI.

## Key Definitions

Table 7 defines key terms used later in this section of the report.

**Table 8.** Key definitions used in Plan Bay Area 2050 equity and performance outcomes reporting

TERM	DEFINITION
Income Quantile 1	Household with income less than \$50,000 in 2020 dollars
Income Quantile 2	Household with income greater than or equal to \$50,000 and less than \$100,000 in 2020 dollars
Income Quantile 3	Household with income greater than or equal to \$100,000 and less than \$170,000 in 2020 dollars
Income Quantile 4	Household with income greater than or equal to \$170,000 in 2020 dollars
Household with Low Income	Household in income quantile 1
Equity Priority Community	Census tracts with a significant concentration of underserved populations, including people of color and households with low incomes; updated using data from the 2014-2018 American Community Survey
Growth Geography	Area identified for future jobs and housing growth in Plan Bay Area 2050, including Priority Development Areas, Priority Production Areas, Transit-Rich Areas, and High-Resource Areas
Transit-Rich Area	Areas within ½ mi of a rail station, ferry terminal, or frequent bus stop (headway of 15 minutes or less during peak periods)
High-Resource Area	A subset of state-identified areas with access to well-resourced schools, open space, jobs and services that meet a minimum transit service threshold. Plan Bay Area 2050 leverages the 2019 California Tax Credit Allocation Committee Opportunity Maps.
Peak Commute Periods	6 a.m. to 10 a.m. and 3 p.m. to 7 p.m

Equity Priority Communities and High-Resource Areas are identified based on today’s data and do not change based on demographic shifts that are forecasted to occur throughout the plan period. Transit-Rich Areas do differ based on the addition of future committed transportation projects in the No Project scenario and on the addition of future committed and planned transportation projects in the Plan and EIR Alternatives.

The following section outlines in detail the methodology used to calculate the equity and performance measures used to describe the outcomes of Plan Bay Area 2050 and the EIR Alternatives.

## Housing and Transportation Costs as a Share of Household Income

Staff estimate the share of household income spent on housing based on the availability of affordable housing, household income distribution, and housing tenure distribution. The housing cost model considers four income quantiles, two tenures (renter and owner), and four types of housing (deed-restricted units, subsidized units, price-controlled units, and market-rate units). The total number of units and the number of deed-restricted units are outputs from BAUS 2. The number of subsidized or price-controlled units are based on data collected from local jurisdictions, and the assumed change between the present-day data and 2050 conditions is influenced by the strategies. Housing costs as a share of income are also varied by tenure and household income, based on Census data.

Households in a given year are distributed across housing type, tenure, and income level, for 32 total combinations of housing type, tenure and household income. A base-year share of household income spent on housing for each of these groups is calculated based on observed data from the Census and other local sources. For deed-restricted and subsidized units, staff assume 29% of household income is spent on housing, per American Housing Survey (AHS) data. For deed-restricted and subsidized units, staff assume the share of income spent on housing is 85.7% of market rate price, per data from New York City. For market-rate housing, staff forecast share of income paid on housing by multiplying the base year share paid by the amount of forecasted mean housing price increase (from a regional housing price model developed by MTC and ABAG staff).

To calculate a regional statistic, staff conduct weighted multiplication to arrive at the overall share of household income spent on housing. Staff also made two important adjustments in assumptions to integrate the impacts of: (1) the Universal Basic Income (UBI) strategy; and (2) strategies that lead to nearly a quarter of Bay Area's housing units being deed-restricted in 2050. Specifically, staff expect the net effect of the UBI strategy to be that higher-income (Q4) households would be taxed to pay for the housing cost subsidies of all low-income (Q1) households. This significantly reduces the cost burden for Q1 households while slightly increasing the cost burden for Q4 households.

To account for the significant share of deed-restricted units in the plan, staff adjusted the counts of rental units in the forecast year for low- and mid-low-income segments accordingly to reflect a larger number of deed-restricted rental units and a smaller number of market-rate rental units for households in Q1 and Q2.

Transportation costs include annual expenditures on transit fares and out-of-pocket operating costs of driving trips, including fuel, maintenance, parking and tolls. These costs are forecasted by Travel Model 1.5, based on simulated travel behavior and assumptions on the cost of fuel, tolls, parking fees and transit fares. These costs are aggregated across all households within a given income quantile and divided by the aggregate income of that income quantile to arrive at the share of household income spent on transportation.

## Average Transportation Expense per Trip

Plan Bay Area 2050 considers the following transportation cost sources, reported as a per trip basis: transit fare; “out of pocket” auto cost; parking cost; and toll. Using the average cost for each of these four metrics does obscure the fact that some residents would see significantly higher costs or lower costs for each of the four metrics – for example, someone that only drives on local streets and road would pay \$0 in tolls, while someone who drives long distances on freeways and crosses one or more toll bridges would pay much more than the average reported for Plan Bay Area 2050. However, the average cost does provide high-level direction on trends for each income quantile.

Travel Model 1.5 simulates the number of transit boardings that would occur for users of each income quantile, based on the transportation network and transit fares available in the scenario. The aggregated total transit fares collected from riders of each income quantile is divided by the number of transit boardings per income quantile to calculate the average transit fare per trip.

Out-of-pocket auto costs include fuel, maintenance, parking and tolls. Fuel and maintenance cost assumptions in future years are built into Travel Model 1.5 – details can be found in the Plan Bay Area 2050 Forecasting and Modeling Report. Parking costs are derived from Travel Model 1.5 outputs, using baseline data on parking costs from local jurisdictions with known parking fees. There are also modifications that are made for the Plan scenario and EIR alternatives as part of the strategy to Expand Transportation Demand Management Initiatives, which includes an increase in parking costs in Plan Bay Area 2050 Growth Geographies and the elimination of employer subsidies for parking.

Toll costs include bridge tolls and express lane tolls in all scenarios, with the addition of means-based per-mile toll expenditures in the Plan and EIR alternatives. All three metrics related to average cost per auto trip (out of pocket auto costs, parking costs and toll costs) are calculated by dividing the total cost by the total number of vehicle trips, meaning that the average cost per resident is lower, as costs shared among carpoolers are not accounted for. Note that out of pocket costs include the cost of parking and tolls, meaning the three auto cost metrics are not additive.

## Share of New Housing Production (2015-2050) That Is Deed-Restricted Affordable

Using outputs from BAUS 2, the increase in the number of deed-restricted units in the region between 2015 and 2050 is divided by the total increase in the number of housing units over the same time period to arrive at the share of new housing production that is deed-restricted affordable.

This calculation is performed at the regional level and for parcels tagged as being within Equity Priority Communities and within High-Resource Areas.

## Share of At-Risk Affordable Housing Preserved as Permanently Affordable

The Plan includes a strategy to preserve all existing affordable housing that is at risk of conversion to market rate housing, identified as high or very high risk of conversion by the California Housing Partnership. These include affordable housing supported by HUD, LIHTC, USDA, and CalHFA projects. As such, BAUS 2 does not lose any currently affordable housing due to appreciation or expiration of subsidies, resulting in 100% of units being preserved in the Plan and EIR alternatives.

## Number and Share of All Bay Area Jobs That Are Accessible

Job accessibility, or the share of all jobs that can be reached within a given time period which varies by mode, is critical to understanding whether the transportation investments and policies in Plan Bay Area 2050 improve access to opportunity. While travel to jobs is only one component of overall access to opportunity — and may in fact not represent the mobility needs of the residents with the fewest resources, this metric is commonly used as a proxy for the overall ease of reaching all destinations.

Travel Model 1.5 “skims” for zone-to-zone congested travel times during the AM peak period for single-occupancy vehicles, public transit, biking and walking. These times are the primary inputs used to calculate this metric. The AM peak period is used because this is when the greatest share of the region’s residents are commuting to work, as well as the period when congestion has the greatest impact on access to jobs for both transit and auto. Using a Python script developed to evaluate accessibility, the “skim” matrices of travel times are loaded into the script, which then calculates for each zone which other zones it can reach either within the following spans of time:

- **Auto:** 30 minutes
- **Transit (all types):** 45 minutes
- **Bike:** 20 minutes
- **Walk:** 20 minutes

The model assumes that auto users are single-occupant vehicle drivers who use tolled freeway lanes (rather than circumventing the tolls through more circuitous routes) under the 2050 Plan.

Once the script has calculated which zones are accessible, the number of jobs accessible for the zone is summed and divided by the total jobs in the region. Using the share of jobs accessible for each zone, a regional share is calculated using a weighted average of all 1,454 zones based on the number of residents residing in each zone. The result reflects the average share of jobs accessible to the average Bay Area resident. This measure is also reported for residents of Equity Priority Communities. The methodology is repeated, this time only considering a subset of the 1,454 zones that are deemed to represent Equity Priority Communities, as defined by the latest available census data (2018 American Community Survey).

Due to limitations of forecasted data, this performance measure could not be determined for accessibility to jobs at different wage levels, or accessibility to other facilities such as schools, parks and other community amenities. These performance measures remain an area of interest for MTC and ABAG in future plan cycles.

## Share of Households and Jobs Within ½ Mile of High-Frequency Transit

MTC maintains a shapefile of existing and planned transit stops, which is used to calculate the share of employment and households in proximity to different transit categories in 2015, in 2050 under No Project, and in 2050 under the Plan and EIR alternatives. First, staff identified locations of high-frequency transit (labeled Major Transit Stops in the shapefile), defined as a site containing any of the following: (1) a rail or bus rapid transit station; (2) a ferry terminal served by either a bus or rail transit service; or (3) the intersection of two or more bus routes with a headway of 15 minutes or less during the morning and afternoon peak commute periods. For the baseline 2015 calculation, only existing major transit stops were used. The 2050 No Project calculation considered all existing major transit stops as well as major transit stops that would exist as the result of committed projects. The 2050 Plan and EIR alternatives calculations extend the No Project list to include planned major transit stops under the given future scenario.

For each calculation, staff then used Geographic Information System (GIS) tools to create half-mile buffers around high-frequency transit stops. These buffers are then used to summarize parcel-level employment and household data outputs from BAUS 2, dividing the number of housing units or jobs within parcels within the buffers by the total number of housing units or jobs in the Bay Area for a given model run.

This performance measure reports on proximity of all households and households with low incomes to transit, and proximity of all jobs as well as retail jobs, as they are more likely to be low-wage jobs.

## Freeway Corridor Peak-Hour Travel Time (Minutes)

Staff identified 10 origin-destination pairs (at the city-to-city level) which would require use of a freeway for most of the trip duration to understand how travel times compare between 2015 and 2050 scenarios across a variety of commute flows throughout the region. To highlight the impacts of the Plan strategy to charge a per-mile toll on select congested freeways with transit alternatives, these origin-destination pairs were considered as either “most of route features all-lane tolling” or “partial or no tolling on route.” Routes where less than 50% of the mileage or less had a per-mile toll applied were considered to have partial or no tolling on route. The list of origin-destination pairs considered is summarized in Table 8.

**Table 9.** Freeway corridors used for peak-hour travel time assessment

PER-MILE TOLLING DESIGNATION	ORIGIN-DESTINATION	FREEWAY CORRIDOR(S)
<b>MOST OF ROUTE FEATURES ALL-LANE TOLLING</b> (under 2050 Plan and EIR Alternatives 1 and 2)	Oakland to San Francisco	I-880, I-80
	Vallejo to San Francisco	I-80
	Antioch to San Francisco	SR-4, SR-242, I-680, SR-24, I-80
	Antioch to Oakland	SR-4, SR-242, I-680, SR-24, I-980
	San Jose to San Francisco	SR-87, US-101
	Oakland to San Jose	I-880
	Oakland to Palo Alto	I-880, SR-84, US-101
<b>PARTIAL OR NO TOLLING ON ROUTE</b> (under 2050 Plan and EIR Alternatives 1 and 2)	Fairfield to Dublin	I-80, I-680
	Livermore to San Jose	I-580, I-680, I-280
	Santa Rosa to San Francisco	US-101 <sup>2</sup>

Average travel times to traverse freeway links associated with each origin-destination pair using general purpose lanes (declining to use Express Lanes to bypass congestion) were sourced from the congested networks of the travel model for each run, for the AM period. The calculation only considered travel times on freeway links and did not account for travel on local streets and roads to access the freeway or destination (except in the case of Santa Rosa to San Francisco).

## Percent of Person Hours in Transit Spent in Crowded Conditions

Within Travel Model 1.5, the choice to use transit is not affected by the vehicle’s capacity. In other words, the demand for transit is unconstrained by vehicle capacity. A new development for Plan Bay Area 2050 was the introduction of a transit crowding impedance factor, which was included in the benefit-cost ratio calculation. MTC and ABAG staff are currently working on improving the representation of transit capacity as part of the development of Travel Model 2, in order to better understand transit crowding challenges and solutions.

To calculate the percent of person hours spent in crowded conditions, the total transit capacity in the AM peak by direction for each link (transit service between two stops) is gathered from Travel Model 1.5 inputs, representing a function of frequency of service and vehicle capacity (number of passengers accommodate including seated and standing passengers). The total demand for transit boardings in the AM peak period, represented by simulated transit boardings without taking transit capacity into account, is also gathered.

<sup>2</sup> City streets, which are not priced under the per-mile tolling strategy, were integrated to add travel time for the last few miles to downtown San Francisco, as there is no highway connection available after exiting the Presidio.

“Crowded conditions” is defined as the vehicle operating at a capacity over 85% of the combined seated and standing capacity. In other words, if unconstrained modeled boardings between two transit stops is greater than 85% of combined seated and standing capacity, that segment of the service is considered crowded. Person hours spent on crowded links, measured as number of passengers multiplied by time to traverse the link, is then divided by person hours spent on all links. The calculation is conducted for each operator and mode combination (i.e., separately for VTA local bus, VTA express bus, and VTA light rail).

## Share of Transit Assets That Are Not in a State of Good Repair

Transit assets, including vehicle assets (vehicles providing passenger service, like buses, ferries or trains) and non-vehicle assets (facilities, rail guideway and vehicles not used to transport passengers) degrade with use and can be deemed either in a state of good repair or not in a state of good repair. 2015 performance for this indicator was assessed in accordance with federal Transit Asset Management guidelines, using data collected from the region’s transit operators on the condition of their assets in 2015. For more information on this process, see Chapter 6 of this document.

2050 performance for this performance metric is assessed using a qualitative determination of the outcomes that would arise for state of good repair for transit assets based on the amount of funding allocated for transit asset maintenance and repair in Plan Bay Area 2050. Staff from MTC and ABAG’s Funding Policy and Programs team estimated the revenues needed to maintain transit assets in today’s condition and the revenues needed to achieve a full state of good repair (0% of assets not in a state of good repair). Funding was only available to maintain existing conditions. As such, 2050 Plan performance for vehicle assets and non-vehicle assets was expected to remain the same between 2015 and 2050, based on the funding available.

## Share of Households That Are Households with Low Incomes

The total number of households with low incomes in the region in 2015 and 2050 is the result of MTC and ABAG’s Regional Growth Forecast, which estimates the number of households by income quantile based on a number of economic and demographic factors. For more information on the regional forecast, see the Plan Bay Area 2050 Forecasting and Modeling Report.

BAUS 2 takes the regional forecast for households and allocates them spatially across parcels. A deeper discussion of this process is included in the Plan Bay Area 2050 Forecasting and Modeling Report, though to summarize, households are placed based on estimated housing unit availability by price. Location of households with low incomes is also determined by the availability and location of deed-restricted affordable housing.

The share of households that are households with low incomes was then calculated regionwide to establish a baseline and then in a series of geographies to better understand the impacts on various goals related to inclusivity and sustainability. Parcels were tagged as being within one of the geography types and reported:

- Areas that are both Transit-Rich and High-Resource
- Transit-Rich Areas
- High-Resource Areas

The total number of households with low incomes was not changed per the impacts of the strategy to implement a statewide universal basic income to have a clearer understanding of the locational choices of households with low incomes.

## Home Ownership Rate for Households with Low Incomes

BAUS 2 does not have the capacity to account for tenure. As such, the performance of Plan Bay Area 2050 in this regard was done using off-model analysis, considering inputs from modeled conditions in BAUS 2.

Observed estimates from the U.S. Census Bureau’s 2014-2018 American Community Survey were used to calculate home ownership rates for households with low incomes. A similar home ownership rate was assumed for 2050, with the Plan and EIR alternatives increasing the number of homes owned by households with low incomes by 100,000 based on the funding in the Plan strategy to increase support for home ownership among households with low

incomes. The share of households with low incomes that own their home was therefore recalculated based on this alteration to arrive at the 2050 figure.

## Share of Neighborhoods (Tracts) with Loss of Households with Low Incomes Between 2015 and 2050

This metric measures the change in households with low incomes at the census tract level, referred to as neighborhoods. The nine-county Bay Area is divided into 1,579 census tracts by the U.S. Census Bureau. While neighborhoods in the Bay Area do not necessarily conform to these boundaries, census tracts provide a neighborhood-scale summary of BAUS 2 parcel outputs.

The metric identifies those neighborhoods that are forecasted to have a net loss in households with low incomes between 2015 and 2050. The reason for “loss” could be the households either being displaced or moving by choice to other locations with more attractive housing or other opportunities. While “displacement risk” itself is difficult to measure given that simulation models cannot track the movement of individual households, the share of neighborhoods that are forecasted to experience a net loss of households with low incomes between 2015 and 2050 may be considered as the share of neighborhoods with risk of displacement.

BAUS 2 forecasts the locations of households by income level, with these outputs being used to execute the calculations described in the above paragraph. The metric is reported for the following geographies:

**Table 10.** Geographies used to report displacement and gentrification

GEOGRAPHY	NUMBER OF NEIGHBORHOODS
Regionwide	1,579
Equity Priority Communities	339
High Displacement Risk Tracts <sup>3</sup>	850
Plan Bay Area 2050 Growth Geographies	492
High-Resource Areas	199
Transit-Rich Areas	344

A key complication in the question of measuring forecasted displacement is understanding the destination of households that move away from their neighborhood. Significant increases in the number of deed-restricted affordable housing units in the Growth Geographies likely attracts households with low incomes to move from their neighborhood in 2015 to deed-restricted housing in Growth Geographies in future years. Under this metric, this would count toward displacement for that neighborhood, even though the family may be moving into a transit-accessible or high-resource area where opportunities are greater. BAUS 2 does not allow for an exploration of where (or why) individual households choose to move; only aggregate counts are reported for each year.

Furthermore, the metric does not capture the positive impact of the Plan strategy to expand renter protections beyond state levels, as this strategy cannot be simulated in BAUS 2. The Plan strategy to implement a statewide universal basic income was also intentionally not accounted for in this metric, in order to have a clearer picture of displacement and gentrification trends.

<sup>3</sup> For more information, refer to the UC Berkeley Center for Community Innovation’s Urban Displacement Project: <https://www.urbandisplacement.org/san-francisco/sf-bay-area-gentrification-and-displacement>.

## Percent of Households in Risk-Prone Areas/Buildings That Are Protected/Retrofit

This performance metric considers three types of risks that can be addressed through retrofits or protections – sea level rise, earthquakes and wildfires of a medium or high risk, as determined by CALFIRE.<sup>4</sup> The methodologies for each of the three risk types are summarized below.

### Sea Level Rise

The universe of parcels in BAUS 2 that would be impacted by 2 feet of sea level rise (the assumed level of rise for the year 2050 for Plan Bay Area 2050 purposes) were identified by intersecting them with three GIS shapefiles for sea level rise. Intersection is a GIS operation that identifies any parcel that has any overlap whatsoever with the sea level rise feature, meaning that parcels where only part of the parcel overlapped with the sea level rise zone were also considered to be affected. Multiple datasets were used due to geographic limitations and in order to capture the most accurate estimate of sea level rise's impacts on the region.

The following data layers related to forecasted sea level rise impacts were used for analysis:

1. National Oceanic and Atmospheric Administration (NOAA): covers the Pacific Coast (west of the Golden Gate Bridge) in Marin, San Francisco and San Mateo counties<sup>5</sup>
2. Bay Conservation and Development Commission (BCDC) Adapting to Rising Tides: covers most of the San Francisco Bay (except areas covered by 3)<sup>6</sup>
3. BCDC Adapting to Rising Tides East Contra Costa: covers shoreline east of Pittsburg<sup>7</sup>

The number of housing units that would have been impacted by sea level rise with no intervention was calculated as the sum of housing units on parcels that intersected with the sea level rise impact features.

Parcels were then tagged as protected based on the investments included in the Plan strategy to adapt to sea level rise. This included all residential parcels within Equity Priority Communities and the majority of all at-risk residential parcels. The number of households no longer impacted as calculated as the number of households on protected parcels.

The share of housing units that were protected from sea level rise was calculated as the number of housing units on protected parcels divided by the number of housing units on affected parcels.

### Earthquakes

Building-level data on building age, number of stories and number of units were used to assign a common seismic deficiency type to all buildings in the region. Deficiency types used for this analysis included homes with a crawlspace and soft, weak story or open front buildings. Comparing against existing inventories for soft, weak story or open front buildings in cities of San Francisco, Oakland, Berkeley, and Alameda staff assumed that roughly 70% of possible deficient buildings captured by the analysis were deficient.<sup>8</sup> For homes with a crawl space a similar 30% reduction was applied given the likelihood for the analysis to be over-estimating deficient buildings.

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4 For more information, State of California Department of Forestry and Fire Protection (2020) California Fire Hazard Severity Zone <https://osfm.fire.ca.gov/divisions/wildfire-planning-engineering/wildland-hazards-building-codes/fire-hazard-severity-zones-maps/>.

5 For more information, see: BCDC Adapting to Rising Tides Eastern Contra Costa Sea Level Rise Analysis and Mapping Project (2019), ECC Inundation Mean Higher High Water Database: 12", 24", 36". <https://eccexplorer.adaptingtorisingtides.org/download>.

6 For more information, see: BCDC Adapting to Rising Tides Bay Area Sea Level Rise Analysis and Mapping Project (2017), Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, Solano, and Sonoma Sea Level Rise Art Geodatabases: 12", 24", 36". <https://explorer.adaptingtorisingtides.org/download>.

7 For more information, see: National Oceanic and Atmospheric Association (2017), Alameda, Contra Costa, Marin, Monterey, Napa, San Francisco, San Mateo, Santa Clara, Santa Cruz, Solano, Sonoma for Sea Level Rise Data Download: 1-, 2-, and 3-Foot Scenarios. [https://coast.noaa.gov/htdata/Inundation/SLR/SLRdata/CA/CA\\_MTR\\_slr\\_data\\_dist.zip](https://coast.noaa.gov/htdata/Inundation/SLR/SLRdata/CA/CA_MTR_slr_data_dist.zip).

8 For more information, see: City of Alameda (2020) Potential Soft Story Buildings (2020) <https://www.alamedaca.gov/Departments/Planning-Building-and-Transportation/Building/Seismic-Retrofit/Potential-Soft-Story-Buildings>; City of Berkeley (2020) Inventory of Potentially Hazardous Soft, Weak, or Open Front Buildings, [https://www.cityofberkeley.info/uploadedFiles/Online\\_Service\\_Center/Planning/2020-01-08%20Soft%20Story%20Inventory%20for%20WEB.pdf](https://www.cityofberkeley.info/uploadedFiles/Online_Service_Center/Planning/2020-01-08%20Soft%20Story%20Inventory%20for%20WEB.pdf), City of Oakland (2020) List of Potential Subject Buildings for City of Oakland Mandatory Soft Story Retrofit Program, <https://cao-94612.s3.amazonaws.com/documents/List-of-Subject-Properties-July-2020.pdf>; City and County of San Francisco (2020) Soft Story Property List <https://sfdbi.org/soft-story-properties-list>.

The Plan strategies allocate funding to retrofit all seismically deficient buildings, so performance for this measure was reported as 100%, though this relies on broad acceptance and implementation on the part of building owners. For more information on how these costs were calculated, see the Plan Bay Area 2050 Technical Assumptions Report.

## Wildfires

All parcels in the Bay Area that intersected the CALFIRE Very High Fire Hazard Severity Zone were tagged as being at risk of wildfire damage. The number of homes at risk of damage from fire was calculated as the number of homes located on the parcels that intersected with the Very High Fire Hazard Severity Zone.<sup>9</sup>

The Plan strategies identify funding to protect all homes that are at a very high risk from wildfire through defensible space and structural modifications, as needed. As such, performance for this measure was reported as 100%, though this relies on broad acceptance and implementation on the part of building owners. For more information on how these costs were calculated, see the Plan Bay Area 2050 Technical Assumptions Report.

## Reduction in Building Risk Exposure to Damage from Earthquake/Wildfire

A single damage reduction percentage was not possible because of the uncertainty in applying risk analysis at such a large regional scale. As such, performance for this metric is reported as a range based on the best available literature.

Literature on fire and seismic retrofit efficacy was reviewed to develop a best guess of what these comprehensive retrofits and defensible space investments would do to reduce damage in future seismic and wildfire events. For wildfire in particular, there was good research that proved damage reductions greater than 50% when homes were both hardened and had adequate defensible space, but the uncertainty about future wildfire behavior and varying research results led us to a larger range.<sup>10</sup>

Similarly, with earthquake retrofits, there are so many building-specific, location-specific, and event-specific characterizations that pinpointing a specific damage reduction factor was not attempted. Using the seismic deficiency assumptions described in the methodology for Share of Households in Risk-Prone Areas/Buildings that Protected/Retrofit above, MTC and ABAG hired a structural engineering consultant to assume model retrofit types and used the Hazus model to calculate the building and contents damage reduction in that event. In severely shaking counties like Alameda County for that scenario earthquake the damage reduction was over 50% for retrofit buildings. In counties that were shaken more lightly in that specific scenario, like Marin, the damage reduction was only 33%. The Hazus model uses damage fragility curve functions for different building types.

Plan Bay Area 2050 represents MTC and ABAG's first foray into forecasting seismic events in a long-range plan, and more work is needed to forecast the impacts of natural hazards like wildfires and earthquakes on our region. However, given the wide array of forces that shape the impacts of these hazards – such as their location, intensity and the public's response prior to, during and after the events, producing concrete predictions remains a challenge.

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9 For more information, State of California Department of Forestry and Fire Protection (2020) California Fire Hazard Severity Zone <https://osfm.fire.ca.gov/divisions/wildfire-planning-engineering/wildland-hazards-building-codes/fire-hazard-severity-zones-maps/>.

10 For more information, see Smith, E., Christopherson, J., Adams G.L. (1994) Living With Wildfire: The Wood Shake and Shingle Roof Hazard, University of Nevada Cooperative Extension Fact Sheet 94-26. <https://www.livingwithfire.com/wp-content/uploads/2020/02/The-Wood-Shake-and-Shingle-Roof-Hazard-fs9426.pdf>; Cohen, J.D. (2000) Preventing Disaster: Home Ignitability in the Wildland-Urban Interface, Journal of Forestry, 2000: 15-21. <https://www.fs.usda.gov/treesearch/pubs/4688>; Syphard, A.D., Brennan, T.J., Keeley, J.E. (2014) The Role of Defensible Space for Residential Structure Protection During Wildfires, International Journal of Wildland Fire, October 2014. [https://d2k78bk4kdhbpr.cloudfront.net/media/publications/files/Syphard\\_defensibleSpace.pdf](https://d2k78bk4kdhbpr.cloudfront.net/media/publications/files/Syphard_defensibleSpace.pdf).

## Annual Traffic Safety Incidents per One Hundred Thousand Residents

Traffic safety incidents, measured as fatalities or serious injuries as defined under MAP-21 guidance, were estimated using vehicle miles traveled data by area type and facility type from Travel Model 1.5.<sup>11,12</sup> Rates of fatalities and serious injuries per vehicle miles traveled by facility type and area type were gathered by MTC and ABAG staff using observed data from the California Statewide Integrated Traffic Records System (SWITRS), with separate fatality rates for motorists, pedestrians and cyclists. Only one serious injury rate was calculated for users of all modes.

These rates of adverse safety outcomes per VMT were applied to outputs from the 2015 simulation of Travel Model 1.5 to estimate baseline fatalities (summed across modes) and serious injuries. The estimates were substantially lower than the observed 2015 figure, so staff calculated a weighting factor that brought the 2015 modeled fatalities by mode and total serious injuries to be equal to the observed 2015 outcomes.

The Plan included a strategy to cap speed limits on highways and local roads. In order to estimate the safety benefits of these speed reductions, staff relied on a study that calculated the relationship between vehicular speed and casualties or injuries based on roadway facility type.<sup>13</sup> The equation used to estimate the revised number of fatalities is shown below in Figure 10 and the table of exponents used is shown in Table 10.

**Figure 10.** Equation used to calculate reduction in fatalities or serious injuries

$$LO_2 = LO_1 \left( \frac{v_2}{v_1} \right)^2$$

Where:

$LO_2$  = number of injury crashes after speed change.

$LO_1$  = initial number of injury crashes (before speed change).

$v_2$  = average speed in the after period (mph or km/h).

$v_1$  = average speed in the before period (mph or km/h).

**Table 11.** Exponents of power functions for the relationship between speed and fatalities or serious injuries

	FREEWAY		NON-FREEWAY	
	EXPONENT	95% INTERVAL CONFIDENCE	EXPONENT	95% CONFIDENCE INTERVAL
Fatalities	4.6	4.0 – 5.2	3.0	-0.6 - 6.5
Serious injuries	3.5	0.5 - 5.5	2.0	0.8-3.2

The estimated number of fatalities by mode and serious injuries was then multiplied by the weighting factor applied to the 2015 estimates to allow for an apples-to-apples comparison. Total fatalities and total serious injuries per 100,000 residents were reported as the performance measure.

11 For more information on classification of fatalities and serious injuries, see: [https://tims.berkeley.edu/help/files/SWITRS\\_codebook\\_20181203.doc](https://tims.berkeley.edu/help/files/SWITRS_codebook_20181203.doc).

12 For more information on facility type and area type in Travel Model 1.5, see: <https://github.com/BayAreaMetro/modeling-website/wiki/HighwayNetworkCoding>.

13 For the full study, see: <https://www.toi.no/getfile.php?mmfileid=13206> as cited by FHWA here: <https://www.fhwa.dot.gov/publications/research/safety/17098/003.cfm>.

A key limitation for this performance measure is that it only accounts for vehicle miles traveled by facility type, area type, and speed. Plan Bay Area 2050 includes billions of dollars in investments for safety-enhancing projects that would protect road users of all types – such as the \$8 billion in facilities for cyclists and pedestrians. Data were not available to quantify the safety improvements of these investments, making the estimates presented for Plan Bay Area 2050 likely to be conservative due to this limitation.

## Daily PM<sub>2.5</sub> Emissions (Tons)

Travel Model 1.5 calculates the average daily regional projections of future vehicle miles traveled (VMT) and produces spatially and temporally specific estimates of travel data by roadway usage and speed. This travel data is input into the California Air Resource Board’s Emission FACTors (EMFAC2017) model to estimate on-road motor vehicle PM<sub>2.5</sub> emissions from road transportation sources which includes passenger vehicles and trucks, as a function of VMT by vehicle type (passenger vehicle, light-duty/small truck (i.e., pick-up truck) and heavy truck) and vehicle speed. Emissions rates for passenger vehicles are a function of assumptions on vehicle fleet composition, including the share of electric vehicles.

## Parks and Trails per Thousand Residents

Analysis of the Plan focused on three core areas to understand the impact of the plan’s strategies on access to open space and recreation opportunities: urban parks, publicly accessible open space acres and trail miles.

### Urban Parks

Using the California Protected Areas Database and California Conservation Easement Database (CPAD), the total acres of publicly accessible open space were identified.<sup>14</sup> Using GIS analysis tools, parks with an acreage of 40 acres or less were identified as urban parks, filtering out primarily natural-land parks, which tend to have larger acreages. This served as the metric for baseline (2015) performance.

To estimate the increase in urban park acres by 2050, impact fee funding from Plan strategies was calculated based on construction of housing units that was simulated in BAUS 2. The median cost for park development and renovation per acre were each assessed using information on park projects recently funded by statewide park bonds (Propositions 68 and 84). Based on these median costs, staff produced an estimate of new park acres and renovated existing acres. This estimate of new acres plus existing acres was then divided by the population in 2050 to arrive at the acres of parks and trails per thousand residents.

To explore the equity implications of a strategy to modernize and expand parks, this metric was reported at the regional scale, and for Equity Priority Communities and High-Resource Areas.

It is essential to note that while the Plan strategy includes funding for maintenance of parks, this metric only reflects new urban park acres.

### Open Space

Using data from CPAD and the California Conservation Easement Database (CCED), protected areas that are accessible to the public were identified within the nine Bay Area counties. This acreage divided by the 2015 population represented performance for 2015.

The Conservation Lands Network (CLN) 2 Report and data framework was used to identify regional goals and priorities for open space conservation in the Bay Area and the number of acres of protected open space (2020) were then compared against CLN goals to identify total acreage needed to meet regional open space conservation goals by 2050. The total acres of publicly accessible open space envisioned by the CLN 2 Report, including existing acres, was divided by the region’s population in 2050.

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14 For more information, see: <https://www.calands.org>.

## Trail Miles

2015 trail miles were calculated using the Regional Trail Network identified by the Bay Area Trails Collaborative. A total of 1,356 miles of trails have been completed, according to the Bay Area Greenprint. This figure, divided by the 2015 population, represents the 2015 performance.

There are 1,584 miles of unfinished trails within the Regional Trail Network, all of which are funded under Plan strategies. The total trail miles, including existing trail miles, were divided by the region's population in 2050 to calculate 2050 performance.

## Daily CO<sub>2</sub> Emissions Per Capita, Relative to 2005

Two different measures of carbon dioxide (CO<sub>2</sub>) emissions per capita are reported for Plan Bay Area 2050. The first adheres to the guidelines established by SB 375 (Steinberg 2008), including only cars and light-duty trucks and excluding emissions reductions that come from vehicle fuel efficiency gains.

Travel Model 1.5 is an activity-based travel demand model, which was used to forecast emissions under various scenarios, allowing for a comparison in emissions between 2005 and 2035 Plan. CO<sub>2</sub> emissions in the 2035 Plan scenario reflect the impacts of the Plan's strategies across the inter-related themes of housing, transportation, the economy and the environment. The California Air Resource Board's EMFAC air quality model was then used to calculate the pounds of CO<sub>2</sub> emissions associated with the forecasted levels of regional travel, broken down by miles of travel by vehicle type and speed.

Some strategies were not able to be analyzed for travel or emissions impacts using Travel Model 1.5, as it is not sensitive to efforts such as outreach and education campaigns (e.g., personalized travel behavior change programs) and non-capacity-increasing transportation investments (e.g., rideshare programs). The GHG emissions impacts for these types of strategies are quantified using "off-model" approaches. These greenhouse gas emission reductions were added to the model calculations, resulting in combined greenhouse gas emission reductions from the Plan as a whole. Change in emissions was calculated at the per-capita level, based on the forecasted 2035 population produced by MTC and ABAG. For more information on the growth forecast, see the Plan Bay Area 2050 Forecasting and Modeling Report.

Total CO<sub>2</sub> emissions reductions are also reported, reflecting all vehicle types and the influence of assumptions around future electric vehicle adoption rates which differ from what is used for SB 375 reporting. For more information on assumed future vehicle fleet composition, see the Plan Bay Area 2050 Forecasting and Modeling Report.

Note that this performance measure is reported for the year 2035 to ensure consistency with the CARB target under SB 375, while other performance measures are reported for the year 2050.

## Commute Mode Share

Commute mode share is represented as the share of people traveling to work on a simulated workday, broken down into the following modes: single-occupancy vehicle, carpool (including transportation network company and taxi), transit, active modes (walk and bike), and telecommute. Mode share is represented for the primary mode of commute tours, as opposed to commute trips. Tours are strings of individual trips (for example, a person going from home to work to the grocery store to home is considered a commute tour).

## Existing Residential Building Stock Efficiency, Relative to 2015

Residential building stock efficiency is reported for three metrics: CO<sub>2</sub> emissions, energy consumption and water consumption. The Plan includes a strategy to upgrade a selection of existing Bay Area residential buildings that exist today to address these three efficiency areas.

The Plan includes sufficient funding to upgrade 650,000 of the region's oldest single and multi-family homes, particularly in Equity Priority Communities. The energy consumption reduction compared to 2015 is based on ABAG's BayREN measured savings from existing program offerings.<sup>15</sup> Energy savings as measured as kWhr are then converted to CO<sub>2</sub> emissions reductions using emissions factors source from the U.S. Environmental Protection Agency.

The Plan also includes funding to address deficient plumbing systems in 175,000 units in multi-family homes across the region. Water savings compared to 2015 are based on studies completed by the Santa Clara Valley Water District, Public Policy Institute of California, Pacific Institute and UC Davis.<sup>16</sup>

Assumptions on the number of homes improved come from placeholder costs and resources available. For more information on how these costs were calculated, see the Plan Bay Area 2050 Technical Assumptions Report.

## Share of Development Between 2015 And 2050 That Is Within Urban Growth Boundaries

The share of development outside of existing urban growth boundaries is the ratio of the number of new acres developed outside the boundaries to the total number of new acres development. To determine whether land is developed, a threshold of more than one housing unit per acre (or the equivalent in non-residential sqft per acre) is used. A building that meets this minimum density requirement would count as a development event. A single new farm house would not qualify as new development.

## Jobs-Housing Ratio

The jobs to housing ratio, calculated as the number of jobs within a given geography divided by the number of housing units in that geography, is a measure of the balance between jobs and housing, with a ratio greater than 1 indicating there are more jobs than homes and a ratio under 1 indicating the reverse.

The number of jobs and housing units located within a county were summarized from BAUS 2 outputs, with performance reported at the regional and county levels. This metric does not account for the influence of telecommuting on the geography of work, with the job site considered to be the employer's location, rather than the location where work is done (the home or a non-work-site location, in the case of telecommuters).

Staff explored the possibility of reporting jobs-housing fit, which measures the distribution of jobs of a certain wage level and housing affordable to that wage level as a complementary metric to further understand how the distribution of jobs and housing throughout the region impacts commute needs. However, MTC and ABAG's models currently are not able to represent jobs by wage level; jobs are represented by industry sector instead. As such, calculating the jobs-housing fit would require various assumptions on the composition of jobs by wage level for each industry sector and geography. The performance metric was not used in Plan Bay Area 2050, though remains an area of interest for MTC and ABAG.

## Mean One-Way Commute Distance (Miles)

Travel Model 1.5 tracks the network distance traveled by trip purpose and traveler income quantile. This performance metric looks only at trips to work, summarizing the average distance for each commute trip for workers with low incomes and for all workers.

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15 For more information, see California Public Utilities Commission (2020) Database for Energy Efficient Resources, Workpaper and Disposition Archive, <http://www.deeresources.com/>.

16 For more information, see Bijoor N. (2019) Water Savings from Turf Removal and Irrigation Equipment Rebates, Valley Water, October 2019.; Pacific Institute (2014) Urban Water Conservation and Efficiency Potential in California, June 2014. <https://pacinst.org/wp-content/uploads/2014/06/ca-water-urban.pdf>; Spang, E.S., Holguin A.J., Loge, F.J. (2018) Estimated Impact of California's Urban Water Conservation Mandate, Environmental Research Letters, Volume 13, Number 1, January 2018. <https://cao-94612.s3.amazonaws.com/documents/List-of-Subject-Properties-July-2020.pdf>.

## Gross Regional Product per Capita

Staff calculated Gross Regional Product (GRP) per capita using GRP and population results from the Final Regional Growth Forecast for the Plan, which was developed using REMI model, v2.3.1. GRP per capita is calculated as the economic output in 2020 dollars divided by the total population of the Bay Area. Performance includes the impacts of strategies and new revenues assumed to come from taxes, such as the inclusion of a mega-measure sales tax to fund new transportation investments.

## Growth in Number of Jobs

The REMI model forecasts the growth in number of jobs in the Bay Area for eleven industry sectors. While information on jobs by wage level is not available from the REMI model, staff categorized the industry sectors into low-wage, middle-wage, and high-wage industries, understanding that there are jobs at all wage levels across industry sectors. For example, a CEO and an entry level employee are given the same classification, based on the sector within which they are employed.

Industry sectors were classified into the three wage levels based on the observed data on wage breakdowns by industry, obtained from the American Community Survey Public Use Microdata Sample (ACS PUMS). The wage level was determined by which wage level comprised the plurality of all jobs within that industry sector regionwide.

Performance was reported as the change in number of jobs regionwide between 2015 and 2050 and the change in jobs over that time period for each of the three wage level tiers. The change in number of jobs located on parcels in Priority Production Areas was also calculated to understand the changes incentivized by the Plan strategy to protect industrial lands through designation of Priority Production Areas.

## Findings



### AFFORDABLE

The Plan makes significant headway in improving housing and transportation affordability for all residents. With sufficient housing at all income levels, including sufficient deed-restricted affordable housing to house all households with low incomes in 2050, the Plan is able to reduce the burden of housing and transportation costs and meaningfully decrease disparities that burden households with low incomes today. While total transportation expenditures, including transit fares, are lower for all, households are forecasted to experience higher expenses for auto trips due to the introduction of means-based per-mile tolls on select freeways and increased parking costs in Growth Geographies. For all forecasted outcomes under the Affordable Guiding Principle, see Figure 11.

Figure 11. Plan Bay Area 2050 equity and performance outcomes: Affordable Guiding Principle

## AFFORDABLE

### Will Bay Area residents spend less on housing and transportation?

Housing + Transportation Costs as a Share of Income		2015	2050 No Project	2050 Plan	2050 EIR Alt 1	2050 EIR Alt 2
Housing + Transportation	Households with Low Incomes	113%	88%	57%	57%	57%
	All Households	58%	49%	45%	45%	45%
Housing	Households with Low Incomes	68%	44%	29%	29%	29%
	All Households	33%	25%	21%	21%	21%
Transportation	Households with Low Incomes	45%	44%	28%	28%	28%
	All Households	25%	24%	24%	24%	24%

Transportation Expenses per Trip (in 2020 dollars)		2015	2050 No Project	2050 Plan	2050 EIR Alt 1	2050 EIR Alt 2
Average Fare per Transit Trip	Households with Low Incomes	\$2.80	\$3.00	\$1.48	\$1.50	\$1.49
	All Households	\$3.18	\$3.44	\$2.94	\$2.91	\$2.66
Average "Out-of-Pocket" Cost per Auto Trip	Households with Low Incomes	\$1.39	\$1.73	\$2.38	\$2.38	\$2.40
	All Households	\$1.58	\$2.14	\$2.74	\$2.71	\$2.75
Average Parking Cost per Auto Trip	Households with Low Incomes	\$0.37	\$0.46	\$1.11	\$1.11	\$1.14
	All Households	\$0.31	\$0.37	\$0.91	\$0.92	\$0.93
Average Toll per Auto Trip	Households with Low Incomes	\$0.05	\$0.05	\$0.11	\$0.12	\$0.11
	All Households	\$0.08	\$0.10	\$0.23	\$0.23	\$0.23

### Will the Bay Area produce and preserve more affordable housing?

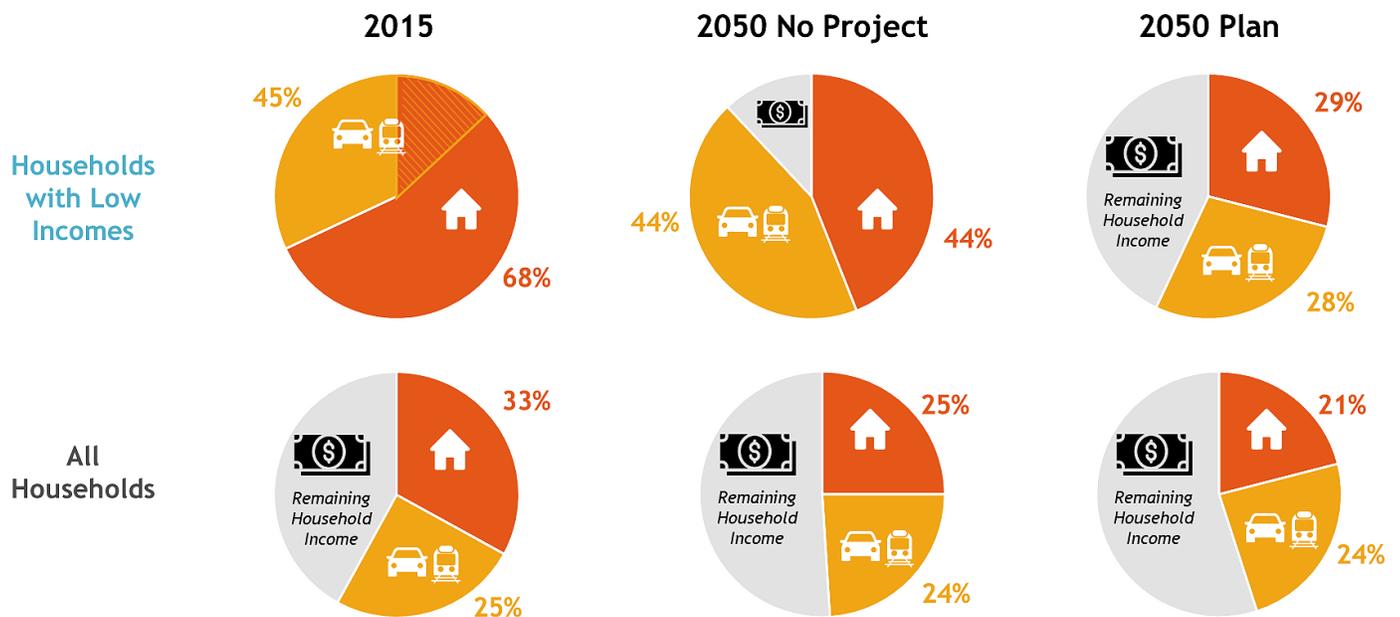
		2015	2050 No Project	2050 Plan	2050 EIR Alt 1	2050 EIR Alt 2
Share of Housing that is Deed-Restricted Affordable	Regionwide	4%	13%	27%	28%	27%
	Equity Priority Communities	11%	18%	39%	39%	37%
	High-Resource Areas	2%	11%	24%	24%	26%
Share of New Housing Production (2015-50) that is Deed-Restricted Affordable			2050 No Project	2050 Plan	2050 EIR Alt 1	2050 EIR Alt 2
	Regionwide		21%	35%	38%	33%
	Equity Priority Communities		14%	33%	35%	27%
	High-Resource Areas		27%	42%	45%	41%
Share of At-Risk Affordable Housing Preserved as Permanently Affordable			2050 No Project	2050 Plan	2050 EIR Alt 1	2050 EIR Alt 2
	Regionwide		n/a	100%	100%	100%

### Key Question: Will Bay Area residents spend less on housing and transportation?

#### Housing and Transportation Costs as A Share of Income

In 2015, Bay Area households spent 58% of their income on housing (33%) and transportation (25%) costs. Households with low incomes had an extreme housing and transportation cost burden of 113% of household income spent on housing and transportation costs. Accounting for people with no incomes, people on financial assistance, and the currently unhoused, housing (68%) and transportation (45%) costs exceeded average incomes for households with low incomes. Strategies in the Plan geared toward housing production at all income levels, preservation of affordable housing, universal basic income, and means-based fares and tolls are forecasted to make the region more affordable for all. Under the Plan in 2050, households with low incomes spend 57% of their income on housing (29%) and transportation (28%) costs, while the average household spends 45%.

Figure 12. Share of household income spent on housing and transportation costs, 2015 vs. 2050 No Project vs. 2050 Plan



### Transport Expenses Per Trip

Transit fare integration in the Plan significantly reduces the average fare per transit trip from \$3.15 in 2015 to \$2.90 in 2050, with greater reductions for households with low incomes due to the introduction of means-based fare discounts, from \$2.80 in 2015 to \$1.50 in 2050. Meanwhile, the average “out-of-pocket” cost per auto trip, which includes fuel, maintenance, parking and tolls, increases for all households in 2050 from \$1.40 in 2015 to \$2.40 in 2050. This increase is driven primarily by the introduction of parking fees and per-mile freeway tolling that are critical for curbing emissions and managing congestion and travel times for all, reflected in performance measures later in this section. The impact on households with low incomes is mitigated through a means-based toll discount and reinvestment of revenues into transportation enhancements in historically disinvested communities.

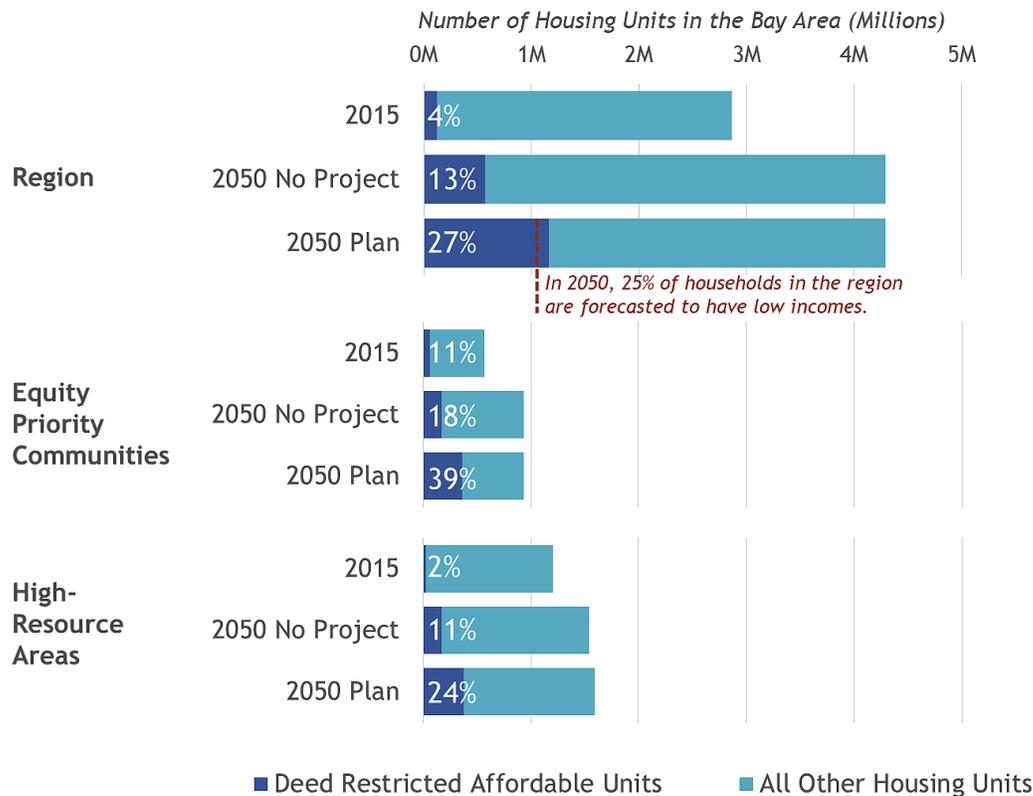
**Key Question:** Will the Bay Area produce and preserve more affordable housing?

### Share of Housing That Is Deed-Restricted Affordable

In 2015, only 4% of the housing units in the Bay Area were deed-restricted and permanently affordable units. Under current affordable housing funding programs that are expected to continue into the future, this share is estimated to be 13% in 2050. Under the Plan, this share is significantly higher, at 27%, driven by the reuse of public land for affordable housing, subsidies to build new and acquire existing affordable homes and minimum affordability requirements for major housing projects.<sup>17</sup> These affordable housing production and preservation strategies were targeted to achieve a share to meet the needs of all households with low incomes, forecasted at 25% of the region’s households in 2050. However, a share of affordable housing subsidies would likely benefit households with moderate incomes as well, consistent with state and federal eligibility standards.

<sup>17</sup> Regional growth forecast totals are not changed throughout the planning process in order to focus on the Plan’s different transportation investments and land use patterns and to assure consistency within the EIR analysis. Due to this, 2050 housing totals are constant for both No Project and Plan outcomes.

**Figure 13.** Share of housing that is deed-restricted affordable, 2015 vs. 2050 No Project vs. 2050 Plan



### Share of New Housing Production (2015-50) That Is Deed-Restricted Affordable

Of the new housing units built between 2015 and 2050, 21% of them are permanently affordable (i.e., deed-restricted) under 2050 No Project, while 35% are permanently affordable under 2050 Plan. This share is even greater in High-Resource Areas (42%) due to strategies that emphasize the need for affordable housing in these locations.

### Share of At-Risk Affordable Housing Preserved as Permanently Affordable

Along with acquiring currently affordable homes, the affordable housing preservation strategy ensures that all existing deed-restricted affordable units at risk of conversion to market-rate units are converted to permanently affordable homes.

## Relative Performance of EIR Alternatives: Affordable Guiding Principle

Affordability outcomes do not change significantly between the Plan and EIR Alternatives.

### EIR Alternative 1

Given that regionwide housing production and preservation levels are consistent in this alternative with the Plan, housing costs as a share of income are similar to the Plan, at 21% in 2050. Affordable housing production as a share of new housing production is higher than the Plan with more development in Transit-Rich Areas, but this does not have a significant effect on housing costs. Transportation costs remain fairly consistent as well, with a slight decrease in the regionwide average as the increased housing in Transit-Rich Areas drives vehicle ownership lower.

### EIR Alternative 2

As in EIR Alternative 1, regional average housing costs as a share of income are similar to the Plan. Notably, the share of housing in High-Resource Areas that are permanently affordable (i.e., deed-restricted) in 2050 is 26%, slightly higher than the 24% share in the Plan. Expanding means-based fare discounts for households with moderate incomes in this alternative helps lower the average fare per transit trip; however, this does not significantly affect the overall expenditure on transportation.



The Plan improves proximity to transit and accessibility to jobs by all modes for all households, with better outcomes for households with low incomes. These outcomes are primarily driven by increased access to affordable housing in Transit-Rich Areas and investments in transportation infrastructure and transit service, prioritized for projects that were forecasted to enhance equitable outcomes for households with low incomes. The Plan strategies manage freeway travel times, but transit crowding continues to persist for major operators. For all forecasted outcomes under the Connected Guiding Principle, see Figure 14.

**Key Question:** Will Bay Area residents be able to access their destinations more easily?

### Percent of All Bay Area Jobs That Are Accessible by Transit, Auto, Bicycle and Walk

The number of Bay Area jobs accessible to the average household within a 45-minute transit trip, including walking and waiting time, doubles from 2015 to 2050 Plan, due to focused housing growth in Transit-Rich Areas and transit expansion strategies. The share of the region's jobs accessible by transit in 45 minutes by residents of Equity Priority Communities increases from 5% to 8%. The number of jobs accessible within a 30-minute drive, well over the number that can be accessed by a 45-minute transit trip, increases by nearly 200,000 jobs between 2015 and 2050; however, the share of the region's jobs that can be accessed is forecasted to decline from 18% to 16.5%. Freeway per mile tolling and transit expansion strategies are critical in managing this share, evidenced by the drop in share to 14% under 2050 No Project for all residents. Biking and walking access to jobs increase slightly, mainly due to greater housing and commercial densities in denser growth areas. Overall, Equity Priority Community residents have greater job accessibility than the average Bay Area resident in 2015, with Plan strategies further advancing equitable outcomes.

### Share of Households and Jobs Within 1/2 Mile of Frequent Transit

In 2015, 31% of all Bay Area households were within half-mile of high frequency transit, defined here as rail, ferry and bus stops with two or more intersecting routes with frequencies less than or equal to 15 minutes. This share was higher for households with low incomes, at 41%. Under the Plan in 2050, nearly half of all households and nearly three-quarters of households with low incomes live within a half-mile of high-frequency transit. Plan strategies focus new affordable housing development in Transit-Rich Areas, while also investing in transit service increases. The share of jobs near high-frequency transit is marked by a smaller increase – 45% in 2015 relative to 51% in 2050 Plan, due to the more dispersed nature of job growth.

For a full breakdown of households in the Bay Area with respect to their proximity to transit, see Figure 15. Proximity to transit, when not defined as “high-frequency transit”, is measured using a 0.25-mile buffer. Relative to 18% in 2015, only 7% of households with low incomes do not have any bus route within a 0.25-mile buffer under the Plan in 2050.

Figure 14. Plan Bay Area 2050 equity and performance outcomes: Connected Guiding Principle

## CONNECTED

### Will Bay Area residents be able to access their destinations more easily?

		2015		2050 No Project		2050 Plan		2050 EIR Alt 1		2050 EIR Alt 2	
<b>Number and Share of all Bay Area Jobs that are Accessible by</b>		Number of Jobs	Share of Jobs	Number of Jobs	Share of Jobs	Number of Jobs	Share of Jobs	Number of Jobs	Share of Jobs	Number of Jobs	Share of Jobs
<b>Transit (45 min) (access by walk)</b>	EPC Residents	197,000	5.1%	335,000	6.2%	433,000	8.0%	454,000	8.4%	460,000	8.5%
	HRA Residents	127,000	3.3%	173,000	3.2%	233,000	4.3%	254,000	4.7%	265,000	4.9%
	All Residents	131,000	3.4%	216,000	4.0%	276,000	5.1%	308,000	5.7%	308,000	5.7%
<b>Auto (30 min)</b>	EPC Residents	765,000	19.8%	784,000	14.5%	1,001,000	18.5%	984,000	18.2%	990,000	18.3%
	HRA Residents	761,000	19.7%	773,000	14.3%	903,000	16.7%	909,000	16.8%	909,000	16.8%
	All Residents	691,000	17.9%	730,000	13.5%	887,000	16.4%	892,000	16.5%	876,000	16.2%
<b>Bike (20 min)</b>	EPC Residents	104,000	2.7%	173,000	3.2%	184,000	3.4%	184,000	3.4%	189,000	3.5%
	HRA Residents	97,000	2.5%	130,000	2.4%	135,000	2.5%	141,000	2.6%	135,000	2.5%
	All Residents	89,000	2.3%	141,000	2.6%	146,000	2.7%	151,000	2.8%	146,000	2.7%
<b>Walk (20 min)</b>	EPC Residents	12,000	0.3%	22,000	0.4%	22,000	0.4%	22,000	0.4%	22,000	0.4%
	HRA Residents	4,000	0.1%	5,000	0.1%	5,000	0.1%	5,000	0.1%	5,000	0.1%
	All Residents	8,000	0.2%	11,000	0.2%	11,000	0.2%	16,000	0.3%	11,000	0.2%

<b>Share of Households and Jobs Within 1/2 Mile of High Frequency Transit</b>		2015	2050 No Project	2050 Plan	2050 EIR Alt 1	2050 EIR Alt 2
<b>Households</b>	Households with Low Incomes		41%	50%	74%	70%
	All Households		31%	43%	49%	47%
<b>Jobs</b>	All Jobs		45%	51%	51%	52%
	Retail Jobs		41%	49%	50%	50%

### Will Bay Area residents have a transportation system they can rely on?

<b>Freeway Corridors Peak-Hour Travel Time (minutes)</b>		2015	2050 No Project	2050 Plan	2050 EIR Alt 1	2050 EIR Alt 2
<b>Most of Route Features All-Lane Tolling (under 2050 Draft Plan and EIR Alternatives)</b>	Oakland-San Francisco		30	55	29	28
	Vallejo-San Francisco		57	111	57	53
	Antioch-San Francisco		74	147	79	72
	Antioch-Oakland		47	94	52	46
	San Jose-San Francisco		64	83	69	71
	Oakland-Palo Alto		54	78	58	57
	Oakland-San Jose		56	81	59	57
	Livermore-San Jose		48	102	66	63
<b>Partial or No Tolling</b>	Fairfield-Dublin		47	57	51	52
	Santa Rosa-San Francisco		68	64	75	75

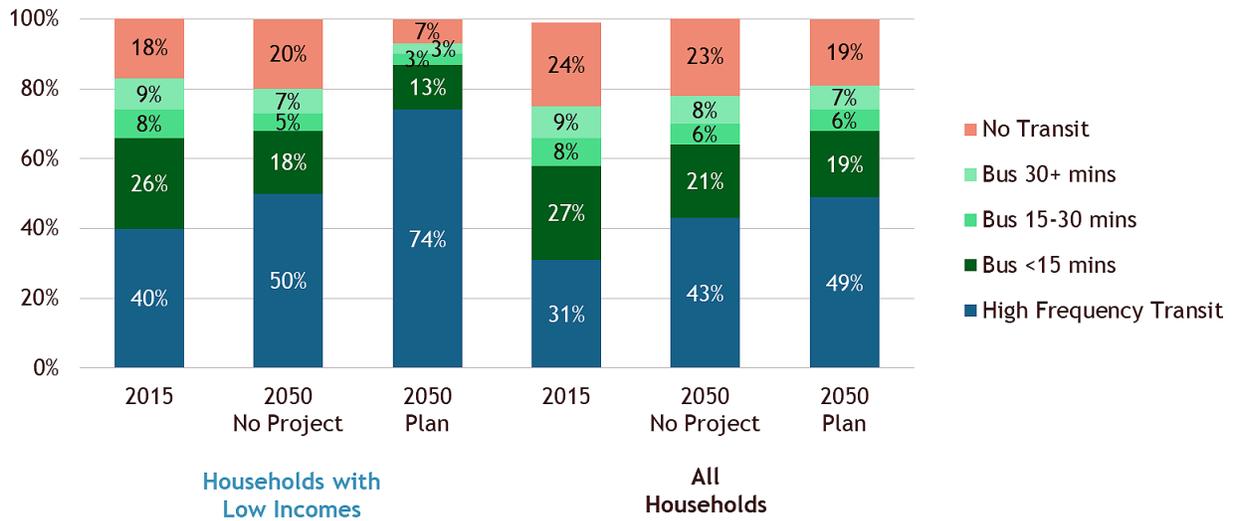
  

<b>Percent of Person Hours in Transit Spent in Crowded Conditions</b>		2015	2050 No Project	2050 Plan	2050 EIR Alt 1	2050 EIR Alt 2
<b>Local Transit</b>	AC Transit Local Bus		0%	32%	33%	7%
	Muni Bus		20%	36%	31%	29%
	SamTrans Local Bus		7%	17%	29%	34%
	VTA Local Bus		0%	46%	41%	29%
	Muni Light Rail		32%	37%	23%	25%
	VTA Light Rail		0%	48%	37%	33%
<b>Regional Transit</b>	AC Transit Transbay Bus		39%	59%	23%	18%
	Golden Gate Express Bus		24%	52%	70%	71%
	BART		19%	62%	22%	17%
	Caltrain		9%	18%	76%	75%
	WETA Ferry		19%	26%	8%	2%

<b>Share of Transit Assets that are Not in a State of Good Repair</b>		2015	2050 No Project	2050 Plan	2050 EIR Alt 1	2050 EIR Alt 2
<b>Vehicle Assets</b>		30%	30%	30%	30%	30%
<b>Non-Vehicle Assets</b>		18%	18%	18%	18%	18%

**Figure 15.** Share of households by proximity to transit (0.5 miles to high frequency transit, 0.25 miles to all other transit)



**NOTE:** Distance (0.25 mile or 0.5 mile) is measured as a straight-line distance; walking distance may be longer.

**Key Question: Will Bay Area residents be able to access their destinations more easily?**

**Peak-Hour Travel Time (Minutes)**

Given a 35% increase in population by 2050, increases in freeway travel times are inevitable in the absence of new measures, as seen under 2050 No Project conditions. For instance, peak-period travel time between Oakland to San Francisco, roughly 30 minutes in 2015, is forecasted to increase to 55 minutes in 2050 No Project; however, it is lowered to 29 minutes under the Plan. Strategies such as per-mile tolling on key freeway corridors to manage demand and smooth congestion over time, transit expansion strategies to provide better alternatives to driving and other transportation demand management strategies, along with focused housing growth in key Growth Geographies, help maintain travel times on key corridors near existing levels, even as lower speed limits reduce free-flow travel speeds.

**Percent of Person Hours in Transit Spent in Crowded Conditions**

With population growth and the full suite of Plan strategies, daily transit boardings increase by a factor of nearly 2.5 between 2015 and 2050. While increased ridership supports critical climate goals, overcrowding on transit vehicles, which risks denial of boardings, is anticipated to rise. Plan strategies that optimize and expand transit service help maintain crowding levels close to baseline (2015) conditions for some operators, but the transit service improvements are insufficient to fully manage overcrowding in the long term. Operators not listed do not have overcrowding challenges in 2050.

**Share of Transit Assets That Are Not in A State of Good Repair**

In 2015, 30% of all transit vehicles had exceeded their federally recommended lifespans. As the Plan only includes sufficient maintenance funding to retain existing conditions, this metric remains relatively unchanged through 2050.

**Relative Performance of EIR Alternatives: Connected Guiding Principle**

Overall job accessibility outcomes are fairly similar between the Plan and the EIR Alternatives, but outcomes for freeway travel times and transit crowding improve slightly in EIR Alternative 1 relative to the Plan.

**EIR Alternative 1**

Access to jobs by transit increases marginally in EIR Alternative 1 as more households are in closer proximity to high frequency transit than in the Plan. Any potential adverse impacts from removing express lanes in this alternative were mitigated by increased transit use, which also enables a small decrease in travel times in many key freeway corridors. Investments to alleviate transit crowding in local transit lower the share of person hours spent in crowded transit for some operators; however, crowding persists.

## EIR Alternative 2

The increase in number of jobs in San Francisco as well as investments to boost transit frequency in High-Resource Areas (which have more housing growth) drives a slight increase in access to jobs by transit, while simultaneously also increasing auto travel times to San Francisco. Other outcomes remain fairly consistent with the Plan.



## DIVERSE

The Plan is designed to create more choices in housing locations for households with low incomes and enable more inclusive communities. Analysis indicates that families with low incomes, many of whom have been displaced to the region's periphery, would opt to relocate to these areas rich with transit and the region's best schools, parks and other infrastructure when affordable housing is available. Plan strategies for renter protections are geared to enable residents to stay in place and reduce the risk of displacement, while assistance for home ownership enhances wealth building opportunities. For all forecasted outcomes under the Diverse Guiding Principle, see Figure 16.

### Key Question: Will Bay Area communities be more inclusive?

#### Share of Households That Are Households with Low Incomes

The share of households with low incomes increases between 2015 and 2050 Plan in both Transit-Rich Areas (from 32% to 39%) and High-Resource Areas (from 20% to 24%). Further, the same share decreases in Equity Priority Communities (from 43% to 41%). Together, these trends suggest lower concentrations of poverty or affluence, and more mixed-income communities in 2050. Focused production and preservation of affordable housing in High-Resource Areas increases access to places of greatest opportunity for households with low incomes, helping reverse historically exclusionary policies in many of these communities.

**Note:** The Universal Basic Income strategy's positive effects in reducing income inequality and decreasing the share of households with low incomes were omitted from the calculation to have a clearer understanding of the trends.

#### Home Ownership Rate

The Plan enables intergenerational wealth-building opportunities with strategies that help nearly 100,000 households with low incomes to own their first home, potentially increasing the home ownership rate from 37% in 2015 to 47% in 2050.

Figure 16. Plan Bay Area 2050 equity and performance outcomes: Diverse Guiding Principle

## DIVERSE

### Will Bay Area communities be more inclusive?

Share of Households that are Households with Low Incomes	2015	2050 No Project	2050 Plan	2050 EIR Alt 1	2050 EIR Alt 2
	Regionwide	26%	28%	28%	28%
Transit-Rich & High-Resource Areas	24%	22%	36%	34%	36%
All Transit-Rich Areas	32%	32%	39%	37%	37%
All High-Resource Areas	20%	21%	24%	25%	27%
Equity Priority Communities	43%	40%	41%	38%	38%

Home Ownership Rate for Households with Low Incomes	2015	2050 No Project	2050 Plan	2050 EIR Alt 1	2050 EIR Alt 2
	Regionwide	37%	37%	47%	47%

### Will Bay Area residents be able to stay in place?

Share of Neighborhoods (Tracts) that Experience Risk of Displacement and Gentrification between 2015 and 2050		Displacement (Net Loss of Households with Low Incomes in the Neighborhood between 2015-2050)				Gentrification (Over 10% Drop in Share of Households with Low Incomes between 2015-2050)			
		2050 No Project	2050 Plan	2050 EIR Alt 1	2050 EIR Alt 2	2050 No Project	2050 Plan	2050 EIR Alt 1	2050 EIR Alt 2
		<b>Region-Wide</b>	All Neighborhoods (total 1579 neighborhoods)	33%	48%	42%	42%	41%	53%
	Equity Priority Communities (total 339 neighborhoods)	45%	40%	35%	44%	61%	49%	57%	58%
	High Displacement Risk Tracts (total 850 neighborhoods)	40%	37%	33%	33%	50%	44%	45%	42%
<b>Within Growth Geographies</b>	Growth Geographies (total 492 neighborhoods)	48%	17%	13%	16%	63%	28%	35%	30%
	High-Resource Areas (total 199 neighborhoods)	48%	17%	12%	6%	57%	19%	21%	10%
	Transit-Rich Areas (total 344 neighborhoods)	51%	9%	7%	12%	70%	21%	32%	27%

## Key Question: Will Bay Area residents be able to stay in place?

### Share of Neighborhoods (Tracts) with Loss of Households with Low Incomes Between 2015 and 2050

Displacement is difficult to forecast and measure, given that simulation models cannot track the movement of individual households. Despite these modeling limitations, this “displacement risk” metric estimates the share of neighborhoods (census tracts) that are forecasted to experience a net loss of households with low incomes between 2015 and 2050. The net loss of such households indicates a risk of displacement, which could indeed be displacement or could instead reflect relocation by choice to other neighborhoods with more attractive housing or other opportunities.

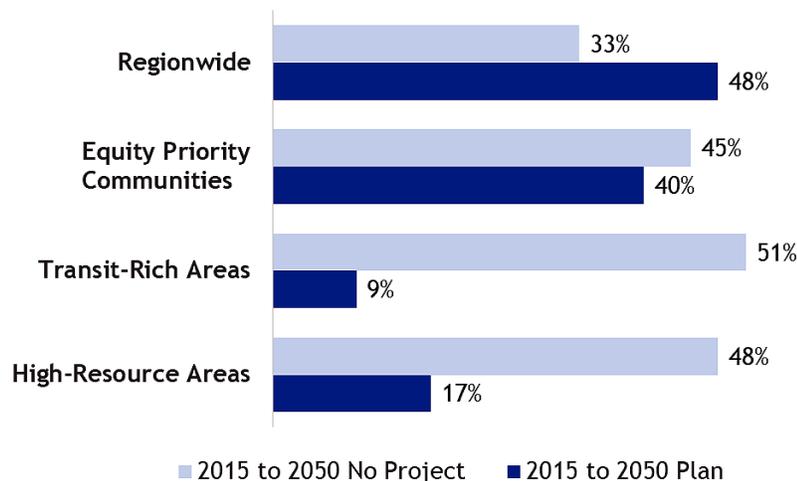
Under 2050 No Project conditions, the share of neighborhoods with risk of displacement between 2015 and 2050 is 33% regionwide, while significantly higher in Equity Priority Communities (45%), Transit-Rich Areas (51%) and High-Resource Areas (48%). Under 2050 Plan, the regionwide share increases to 48%, indicating that more neighborhoods may be at risk of displacement. However, the significant drop in the metric in High-Resource Areas (17%) and Transit-Rich Areas (9%) indicates that the increase is mainly driven by households with low incomes relocating to these Growth Geographies – neighborhoods near frequent transit and/or in high-resource areas – where much of the new affordable housing is being developed under the Plan strategies.

Growth Geographies also experience some displacement risk. However, analysis indicates that much of this displacement is actually households with low incomes relocating between these neighborhoods, rather than being displaced to neighborhoods that lack quality transit or access to opportunity. Lastly, and importantly, the displacement risk metric does not fully capture the positive impact of protection policies at the local level, which could further reduce displacement risk and prevent homelessness.

**Note:** The positive effects of the Universal Basic Income strategy in reducing income inequality and decreasing the share of households with low incomes were intentionally omitted from the calculation to have a clearer understanding of displacement trends.

**Note:** Displacement is defined as a net loss in number of households with low incomes in the neighborhood (tract) between 2015 and 2050.

**Figure 17.** Share of neighborhoods that experience loss of households with low incomes between 2015 and 2050, 2050 No Project vs. 2050 Plan



## Relative Performance of EIR Alternatives: Diverse Guiding Principle

Differences in outcomes between the Plan and the EIR Alternatives under the Diverse Guiding Principle are driven by the change in housing patterns.

### EIR Alternative 1

In this alternative, the share of households with low incomes in High-Resource Areas is marginally higher (25%) relative to the share in the Plan (24%). While the share of households with low incomes in Transit-Rich Areas is slightly lower than the Plan (37% vs. 39% in Plan), this is mainly due to higher overall household growth in these areas, given the strategies' focus on growth near transit. Risk of displacement is lower, both overall and in Equity Priority Communities, as this housing growth pattern enables more low-income residents to continue living in current communities, but with a greater share residing in deed-restricted affordable housing.

### EIR Alternative 2

In this alternative, strategies shift more development, including deed-restricted affordable housing, toward High-Resource Areas, making these traditionally exclusive communities somewhat more inclusive than the Plan. The share of households with low incomes in these neighborhoods increases to 27% by 2050, relative to 24% under the Plan. However, this shift in housing development locations also means that less housing, including affordable housing, is constructed in Equity Priority Communities, meaning that fewer residents in today's low-income communities and communities of color are able to remain in place through 2050. Under this alternative, 44% of EPCs have a risk of displacement, relative to 40% under the Plan, despite a decrease in the risk of displacement regionwide (42% under EIR Alternative 2 vs. 48% under Plan).



## HEALTHY

All performance measures under the Healthy Guiding Principle trend in a positive direction with the Plan. Bay Area residents are forecasted to be healthier and safer, with better access to parks, improved air quality, and increased safety from vehicle collisions, and lowered risk exposure to natural hazards. The Plan also plans for the Bay Area environment to be healthy and safe, with strategies that lower dependence on driving for commuting, manage greenhouse gas emissions substantially, reduce carbon footprint of the building stock and focus most of the development within the existing urban footprint. For all forecasted outcomes under the Healthy Guiding Principle, see Figure 18.

Figure 18. Plan Bay Area 2050 equity and performance outcomes: Healthy Guiding Principle

## HEALTHY

### Will Bay Area residents be healthier and safer?

Percent of Households in Risk-Prone Areas/Buildings that are Protected/Retrofit		2050 No Project	2050 Plan	2050 EIR Alt 1	2050 EIR Alt 2	
Sea Level Rise (2ft)	Equity Priority Communities	n/a	100%	100%	100%	
	All Households	n/a	98%	98%	98%	
Earthquake	Equity Priority Communities	n/a	100%	100%	100%	
	All Households	n/a	100%	100%	100%	
Wildfire High / Medium Risk	Equity Priority Communities	n/a	100%	100%	100%	
	All Households	n/a	100%	100%	100%	
Reduction in Building Risk Exposure to Damage from Earthquake or Wildfire		2050 No Project	2050 Plan	2050 EIR Alt 1	2050 EIR Alt 2	
Regionwide		n/a	-25%	-25%	-25%	
Annual Incidents, per One Hundred Thousand Residents		2015	2050 No Project	2050 Plan	2050 EIR Alt 1	2050 EIR Alt 2
Fatalities		6.0	6.3	4.9	4.9	4.9
Injuries		26.0	27.4	23.0	22.9	22.9
Daily PM2.5 Emissions (tons)		2015	2050 No Project	2050 Plan	2050 EIR Alt 1	2050 EIR Alt 2
Regionwide		5.3	5.1	4.4	4.4	4.4
Parks and Trails Per Thousand Residents		2015	2050 No Project	2050 Plan	2050 EIR Alt 1	2050 EIR Alt 2
Urban Park Acres	Equity Priority Communities	1.4	1.4	2.3	2.3	2.3
	High-Resource Areas	2.1	2.4	2.4	2.4	2.4
	All Households	1.7	1.8	2.1	2.1	2.1
Trail Miles	Regionwide	0.2	0.2	0.3	0.3	0.3
Open Space Acres	Regionwide	118.0	121.0	149.0	149.0	149.0

### Will the environment of the Bay Area be healthier and safer?

Daily CO2 Emissions Per Capita, Relative to 2005	2015	2035 No Project	2035 Plan	2035 EIR Alt 1	2035 EIR Alt 2	2050 No Project	2050 Plan	2050 EIR Alt 1	2050 EIR Alt 2
Cars and light-duty trucks (SB 375)	-1%	2%	-20%	-21%	-21%	5%	-17%	-19%	-18%
All vehicles (including fuel efficiency gains)	-8%	-41%	-48%	-48%	-48%	-43%	-51%	-52%	-52%
Commute Mode Share	2015	2050 No Project	2050 Plan	2050 EIR Alt 1	2050 EIR Alt 2				
Auto: Single Occupancy	50%	44%	33%	33%	33%				
Auto: Other	20%	19%	17%	17%	17%				
Transit	13%	17%	19%	19%	20%				
Active Modes (Bike/Walk)	5%	6%	9%	9%	9%				
Telecommute	11%	15%	22%	22%	21%				
Existing Building Stock Efficiency, Relative to 2015			2050 No Project	2050 Plan	2050 EIR Alt 1	2050 EIR Alt 2			
CO2 Emissions			n/a	-16%	-16%	-16%			
Energy Consumption			n/a	-16%	-16%	-16%			
Water Consumption			n/a	-8%	-8%	-8%			
Share of Development between 2015-2050 that is Within Urban Growth Boundaries			2050 No Project	2050 Plan	2050 EIR Alt 1	2050 EIR Alt 2			
Regionwide			95%	97%	97%	97%			

## Key Question: Will Bay Area residents be healthier and safer?

### Reduction in Building Risk Exposure to Damage from Earthquakes or Wildfire

With Plan strategies in place, 98% of all Bay Area households that would be affected by two feet of sea level rise are protected. All common seismically deficient housing types and homes built in very high wildfire-risk zones are retrofitted to reduce the likelihood of damage in future earthquakes and wildfires. Protection and adaptation investments and means-based retrofit subsidies for residential buildings are prioritized in Equity Priority Communities. Retrofit strategies are expected to reduce the risk of damage from earthquakes or wildfires by 25% to 50%.

### Annual Incidents, Per One Hundred Thousand Residents

This metric measures freeway and non-freeway fatalities and injuries from vehicle collisions with other vehicles, pedestrians, bicyclists. Notably, this metric mainly captures the impact of change in vehicle miles traveled and speeds arising from Plan strategies, but it does not capture design improvements and programs that may change driver behavior since they cannot be represented in Travel Model 1.5. Based on the simulation, the rate of fatalities and injuries decreases in 2050 with reduced speed limits and enhanced street design under the Vision Zero strategy, but it remains far from zero incidents. Street design enhancements and additional education programs proposed in the Plan strategies would be required to make further headway towards this important goal.

### Air Quality: Daily PM<sub>2.5</sub> Emissions (Tons)

Despite increases in population and total miles driven, fine particulate matter emissions (PM<sub>2.5</sub>) are forecasted to be lower than 2015 levels, fine particulate matter emissions decrease due to cleaner and more fuel-efficient vehicles as well as a significant reduction in freeway vehicle miles traveled.

### Parks and Trails Per Thousand Residents

Bay Area residents have increased access to recreation opportunities, thanks to Plan strategies to protect natural lands and invest in parks and trail facilities. Strategies to prioritize park investments in Equity Priority Communities not only help increase acreage of park space in those communities and decrease disparities, but also quality of parks (not reflected in metric).

## Key Question: Will the environment of the Bay Area be healthier and safer?

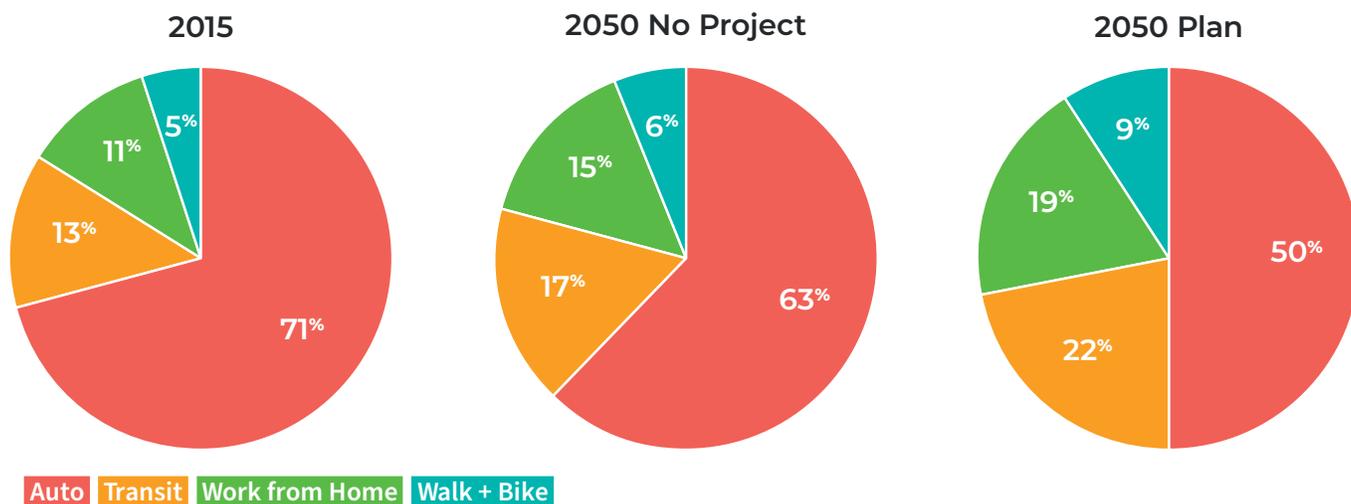
### Daily CO<sub>2</sub> Emissions Per Capita, Relative to 2005

Greenhouse gas emission levels per capita are forecasted to drop by 20% in 2035 relative to 2005 levels, meeting the state-mandated target of 19% for the region. This is driven by strategies across all four elements of the plan (transportation, housing, economy and environment) primarily by allowing increased housing and commercial densities in Growth Geographies, transportation demand management strategies including parking and tolling fees, and significant investment in clean vehicle initiatives. The projected decrease in emissions is even greater when the metric accounts for all vehicle types and future state-imposed restrictions on fuel efficiencies.

### Commute Mode Share

With more efficient land use patterns, tolling and parking fee strategies, sustainable commute targets for major employers, and increased investment in alternative modes, the commute mode share of single-occupancy auto travel drops from 50% in 2015 to 33% in 2050 and overall auto from 71% in 2015 to 50% in 2050 (see Figure 19), thanks to more people choosing transit, telecommuting, walking and bicycling.

Figure 19. Commute mode share, 2015 vs. 2050 No Project vs. 2050 Plan



NOTE: Percentages may not sum to 100% due to rounding.

### Existing Building Stock Efficiency, Relative to 2015

Retrofit strategies in the Plan make the Bay Area’s existing residential building stock more resource-efficient, reducing their carbon footprint and energy consumption by 16% and water consumption by 8% in 2050 relative to 2015 levels.

### Share of Development Between 2015 And 2050 That Is Within Urban Growth Boundaries

Under the Plan, 97% of the new development is within urban growth boundaries, thanks to the strategy that maintains existing urban growth boundaries. Roughly 1,300 acres of land are developed outside existing boundaries. It is essential to note that the Plan does include some greenfield development within urban growth boundaries which is not reflected within this metric.

### Relative Performance of EIR Alternatives: Healthy Guiding Principle

Outcomes for health and safety of Bay Area residents are unchanged among the Plan and EIR Alternatives. Environmental outcomes only marginally improve in the EIR Alternatives.

#### EIR Alternative 1

Greenhouse gas emission reductions per capita in 2035 relative to 2005 are similar to the Plan at 21%, meeting the state-mandated target of 19% for the region. Commute mode share of single occupancy auto is consistent with the Plan, at 33%. The share of development between 2015 and 2050 within urban growth boundaries remains consistent with the Plan at 97%.

#### EIR Alternative 2

Greenhouse gas emission reductions per capita in 2035 relative to 2005 are similar to the Plan at 21%, also meeting the state-mandated target of 19% for the region. As in the Plan and EIR Alternative 1, commute mode share of single occupancy auto is forecasted at 33%. The share of development between 2015 and 2050 within urban growth boundaries remains consistent with the Plan at 97%.

## VIBRANT

Under the Plan, jobs and housing in the Bay Area will be more evenly distributed than in 2015 or 2050 No Project, as Plan strategies are able to bring more jobs to housing-rich counties. Robust economic output and job growth indicators suggest that the Bay Area economy will thrive under the Plan with new regional revenue sources invested back into the region’s transportation, housing, economy and environment. For all forecasted outcomes under the Vibrant Guiding Principle, see Figure 20.

Figure 20. Plan Bay Area 2050 equity and performance outcomes: Vibrant Guiding Principle

## VIBRANT

### Will jobs and housing in the Bay Area be more evenly distributed?

Jobs-Housing Ratio	2015	2050 No Project	2050 Plan	2050 EIR Alt 1	2050 EIR Alt 2
Regionwide	1.50	1.34	1.34	1.34	1.34
Alameda	1.58	1.40	1.40	1.37	1.43
Contra Costa	1.06	0.74	0.97	1.17	1.00
Marin	1.25	0.90	0.80	0.84	0.88
Napa	1.42	1.51	1.56	1.56	1.61
San Francisco	1.86	1.91	1.59	1.44	1.94
San Mateo	1.47	1.26	1.28	1.15	1.22
Santa Clara	1.78	1.56	1.51	1.52	1.32
Solano	0.93	0.95	1.14	1.30	1.12
Sonoma	1.18	1.21	1.14	1.14	1.12

Mean One-Way Commute Distance (miles)	2015	2050 No Project	2050 Plan	2050 EIR Alt 1	2050 EIR Alt 2
Workers with Low Incomes	9.4	10.0	9.0	9.5	8.9
All Workers	12.0	12.5	11.5	11.3	11.7

### Will the Bay Area economy thrive?

Growth in GRP Per Capita (from 2015 to 2050)	2050 No Project	2050 Plan	2050 EIR Alt 1	2050 EIR Alt 2
Regionwide	n/a	66%	66%	66%

Growth in Number of Jobs (from 2015 to 2050)	2050 No Project	2050 Plan	2050 EIR Alt 1	2050 EIR Alt 2
All Jobs	35%	35%	35%	35%
Low-Wage Industries	30%	30%	30%	30%
Middle-Wage Industries	34%	34%	34%	34%
High-Wage Industries	40%	40%	40%	40%
Priority Production Areas	68%	83%	74%	96%

## Key Question: Will jobs and housing in the Bay Area be more evenly distributed?

### Jobs-Housing Ratio

The regionwide jobs-to-housing ratio decreases from 1.50 in 2015 to 1.34 by 2050, reflecting a higher ratio of housing to job production to accommodate pent-up demand for housing. Plan strategies that enable more housing in job-rich areas, such as allowances for increased densities in Growth Geographies and accelerated reuse of public land, were particularly successful in the West and South Bay, bringing the ratio closer to the regionwide average in San Francisco (1.86 in 2015 to 1.59 in 2050), San Mateo (1.47 in 2015 to 1.28 in 2050), and Santa Clara (1.78 in 2015 to 1.51 in 2050) counties in 2050. Meanwhile, encouraging job growth in housing-rich areas continues to be a challenge. Incentives to encourage employers to shift jobs to housing rich areas bring the ratio closer to the regionwide average in Napa (1.42 in 2015 to 1.56 in 2050), and Solano (0.93 in 2015 to 1.14 in 2050) counties, while Contra Costa (1.06 in 2015 to 0.97 in 2050), and the other North Bay counties continue to have more housing than jobs.

### Mean Commute Distance (Miles)

Commute distance is a critical indicator of jobs-housing imbalance, and a measure of whether people are able to get to their desired jobs easily. Under existing 2015 conditions, Bay Area workers had an average commute distance of 12 miles, while workers with low incomes have an average commute distance of 9.4 miles. The average commute distance increases under 2050 No Project conditions. The Plan lowers the average commute distance by half a mile for all workers relative to 2015 and one mile relative to 2050 No Project – a small yet meaningful shift in the right direction.

## Key Question: Will the Bay Area economy thrive?

### Growth in Gross Regional Product Per Capita (from 2015 to 2050)

The region's economic recovery is expected to be robust through 2050, with a real gross regional product per capita growth of 66% between 2015 and 2050, or an annual growth rate of 1.5%, even when accounting for the inclusion of significant new regional tax measures to fund transit expansion projects, affordable housing, universal basic income, sea level rise mitigations, and more. For comparison, the real annual growth rate that the region experienced between 2001 and 2015 was 1.8%.

### Growth in Number of Jobs (from 2015 to 2050)

The long-term growth in number of jobs in high-wage industries continues to outpace overall job growth region-wide. Meanwhile, jobs in middle-wage industries keep pace, with some of that growth occurring in newly designated Priority Production Areas. Middle-wage industry job growth rate between 2015 and 2050 Plan is forecasted at 34% (0.84% annual growth rate), while overall job growth rate is forecasted at 35% (0.86% annual growth rate). For reference, the middle-wage industry job growth from 1990-2015 was 18% (0.68% annual growth rate), relative to overall job growth rate of 25% (0.90% annual growth rate). While job growth is slower in low-wage industries, universal basic income programs and other strategies to drive economic mobility under the Plan are geared towards reducing income inequality for those continuing to work in lower-wage occupations.

**Note:** All regional forecast totals are not changed throughout the Plan process in order to focus on the Plan's different transportation investments and land use patterns and to assure consistency within the EIR analysis.

## Performance of EIR Alternatives: Vibrant Guiding Principle

While the Plan and EIR Alternative 1 are able to make progress on bringing the ratio of jobs to housing closer to the regionwide ratio, EIR Alternative 2 perpetuates today's high jobs-housing imbalance in San Francisco County.

### EIR Alternative 1

Under this alternative, the increased focus on housing in Transit-Rich Areas results in a slightly more dispersed job growth pattern than the Plan and a slightly more even distribution of jobs and housing. The jobs-housing ratio decreases in San Francisco (1.44), San Mateo (1.15) and Alameda (1.37) counties, which have more Transit-Rich Areas. On the other hand, the jobs-housing ratio increases in Contra Costa (1.17) and Solano (1.30) counties, approaching the regionwide average of 1.34.

### EIR Alternative 2

While the Plan and EIR Alternative 1 succeed in incentivizing job growth in some housing-rich counties and more evenly distributing jobs and housing across the region, EIR Alternative 2 further concentrates jobs in San Francisco County. The new economic strategy to disallow office development in job-rich exclusionary cities, and their neighbors, has adverse impacts for Silicon Valley while yielding additional job growth in (already jobs-rich) San Francisco. The jobs-housing ratio in San Francisco County continues to be high in 2050 at 1.94, well above the regionwide average (1.34). Meanwhile, jobs-housing ratios remain low in currently housing-rich counties such as Contra Costa (1.00) and Solano (1.12).

## Chapter 6 | Federally Required System Performance Report

In response to the passage of the Moving Ahead for Progress in the 21st Century Act (MAP-21) and the Fixing America's Surface Transportation (FAST) Act, the Federal Highway Administration (FHWA) and the Federal Transit Administration (FTA) established a Transportation Performance Management program. The intent of the program is to orient transportation investment decision-making around national transportation goals, thus increasing the accountability of Federal programs while also moving toward a performance-based planning and programming paradigm.

Through this program, State Departments of Transportation (DOTs), Metropolitan Planning Organizations (MPOs), and transit agencies are responsible for setting short-term (one- to four-year) targets for 28 performance measures covering the following federal goal areas:

- Safety
- Infrastructure Condition
- System Reliability
- Freight Movement and Economic Vitality
- Congestion Reduction
- Environmental Sustainability

As the MPO for the San Francisco Bay Area, MTC works alongside partners such as the California Department of Transportation (Caltrans) and transit operators serving the Bay Area to regularly report on performance and set regional targets in accordance with the target-setting schedule dictated at the federal level.

MTC has been engaged in performance monitoring work through MAP-21 since 2018, the first year that targets were required. As of the writing of this report in April 2021, MTC has engaged in multiple rounds of target-setting as appropriate, summarized in Table 11. MTC has set targets for 21 of the 28 required performance targets, with targets for the remaining 7 performance measures scheduled to be set later in 2021.

Federal guidelines dictate when an MPO is required to set a numeric target and when an MPO may support the numeric target set by the State. MTC's target-setting approach thus far has been to support the targets set by Caltrans when the targets are in agreement with MTC's goals, while setting regional targets when required by law or when the region seeks to set more ambitious targets than the State as a whole.

Table 12. MTC MAP-21 target-setting status

FEDERAL GOAL AREA	PERFORMANCE MEASURE	TARGET-SETTING FREQUENCY	TARGET-SETTING STATUS AS OF MAY 2021
Safety	Total number of road fatalities	Annual	Targets adopted for 4 cycles
	Road fatalities per 100M VMT	Annual	Targets adopted for 4 cycles
	Total number of serious injuries on roads	Annual	Targets adopted for 4 cycles
	Serious injuries on roads per 100M VMT	Annual	Targets adopted for 4 cycles
	Combined total number of non-motorized fatalities and serious injuries	Annual	Targets adopted for 4 cycles
	Total number of reportable transit fatalities	Annual	First round of target-setting delayed by FTA in response to the COVID-19 pandemic. First round of target-setting expected by December 2021.
	Reportable transit fatalities per revenue mile by mode	Annual	
	Total number of reportable transit injuries	Annual	
	Reportable transit injuries per revenue mile by mode	Annual	
	Total number of reportable transit safety events by mode	Annual	
	Reportable transit safety events per revenue mile by mode	Annual	
	Mean distance between major mechanical failures by mode	Annual	

FEDERAL GOAL AREA	PERFORMANCE MEASURE	TARGET-SETTING FREQUENCY	TARGET-SETTING STATUS AS OF MAY 2021
Infrastructure Condition	Percentage of pavements on the Interstate Highway System (IHS) in good condition	4 years	Targets adopted for 1 cycle
	Percentage of pavements on the IHS National Highway System (NHS) in poor condition	4 years	Targets adopted for 1 cycle
	Percentage of pavements on the non-IHS NHS in good condition	4 years	Targets adopted for 1 cycle
	Percentage of pavements on the non-IHS NHS in poor condition	4 years	Targets adopted for 1 cycle
	Percentage of NHS bridges by deck area classified in good condition	4 years	Targets adopted for 1 cycle
	Percentage of NHS bridges by deck area classified in poor condition	4 years	Targets adopted for 1 cycle
	Percentage of revenue vehicles that have met or exceeded their useful life benchmark by asset class	Annual	Targets adopted for 1 cycle
	Percent of facilities with a condition rating below fair by asset class	Annual	Targets adopted for 1 cycle
	Percentage of guideway directional route-miles with performance restrictions	Annual	Targets adopted for 1 cycle
	Percentage of non-revenue vehicles that have met or exceeded their ULB	Annual	Targets adopted for 1 cycle
System Reliability	Percentage of person-miles traveled on the IHS that are reliable	4 years	Targets adopted for 1 cycle
	Percentage of person-miles traveled on the non-IHS NHS that are reliable	4 years	Targets adopted for 1 cycle
Freight Movement and Economic Vitality	Percentage of IHS mileage providing reliable truck travel times	4 years	Targets adopted for 1 cycle
Congestion Reduction	Annual hours of peak-hour excessive delay per capita by urbanized area	4 years	Targets adopted for 1 cycle
	Percent of non-single-occupancy vehicle travel by urbanized area	4 years	Targets adopted for 1 cycle
Environmental Sustainability	Total emissions reductions from CMAQ-funded projects by pollutant	4 years	Targets adopted for 1 cycle

## Road Safety

The final rule from FHWA established five performance measures to assess progress towards the road safety goal, defined as such:

**Table 13.** Road safety performance measures

MEASURE	DEFINITION
Number of fatalities	The number of people involved in a crash with the outcome fatal injury.
Rate of fatalities per 100 million vehicle miles traveled	The number of people involved in a crash with the outcome fatal injury, divided by the number of vehicle miles traveled on roads within the jurisdiction in hundreds of millions of miles.
Number of serious injuries	The number of people involved in a crash with the outcome suspected serious injury.
Rate of serious injuries per 100 million vehicle miles traveled	The number of people involved in a crash with the outcome suspected serious injury, divided by the number of vehicle miles traveled on roads within the jurisdiction in hundreds of millions of miles.
Number of non-motorized fatalities and non-motorized serious injuries	The number of pedestrians or cyclists involved in a crash with the outcome fatal injury or suspected serious injury.

Regional targets are set annually by the State Department of Transportation in August and the MPO the following February. Data on current and past performance for fatalities are sourced from the Fatality Analysis Reporting System (FARS), while injury data are sourced from the Statewide Integrated Traffic Records System (SWTRS). Data on vehicle miles traveled are source from the Caltrans Highway Performance Monitoring System (HPMS). Performance for number and rate of serious injuries reflects the updated definition for serious injuries, which was expanded in mid-2017 to include suspected serious injuries, rather than only serious injuries confirmed on-site.

For road safety, an MPO has the option to set regional numeric targets or support the State target. Given the Bay Area’s commitment to advancing road safety and the ongoing initiatives that seek to bend the curve of fatalities and serious injuries toward zero, MTC opted to set aspirational targets in line with Vision Zero, an approach the agency has taken in 2019, 2020 and 2021 target-setting cycles. Such initiatives include the adoption of the Resolution 4400, establishing a Regional Safety/Vision Zero Policy, the initiation of the development of a regional safety data system, and ongoing work to support local jurisdictions through technical assistance and information-sharing networks. Under MTC’s Vision Zero-based target-setting methodology, road safety targets were set based on a linear decline toward zero fatalities and serious injuries in the year 2030 starting in 2019 (Table 13).

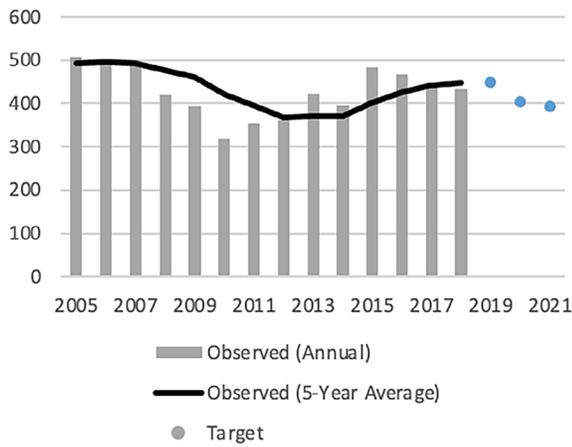
**Table 14.** MTC regional road safety targets (2021)

MEASURE	BASELINE (2014-2018)	2021 TARGET
Number of fatalities	445.2	392.6
Rate of fatalities per 100 million vehicle miles traveled	0.707	0.612
Number of serious injuries	2,141.6	2,248.0
Rate of serious injuries per 100 million vehicle miles traveled	3.399	3.499
Number of non-motorized fatalities and non-motorized serious injuries	800.0	755.5

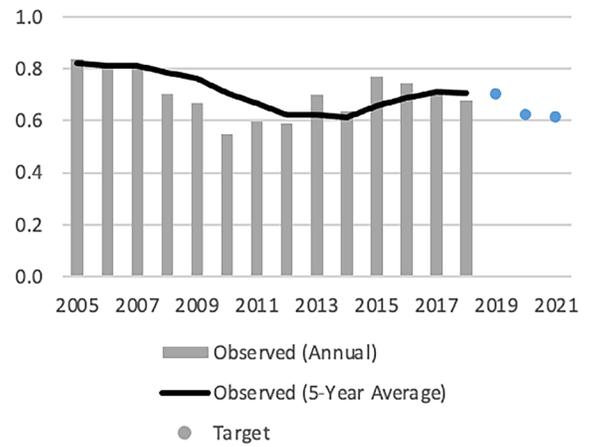
SOURCE: Fatality Analysis Reporting System, Statewide Integrated Traffic Records System, and Caltrans Highway Performance Monitoring System

The latest finalized road safety data are available for the year 2018; more recent data are still considered to be preliminary by the data providers. MTC supported State targets in the 2018 target-setting round, so there is no regional numeric target to which 2018 performance may be compared. Starting when 2019 data are available, MTC will be able to compare performance to targets. MTC's historical performance and targets are shown in Figure 21 through Figure 25.

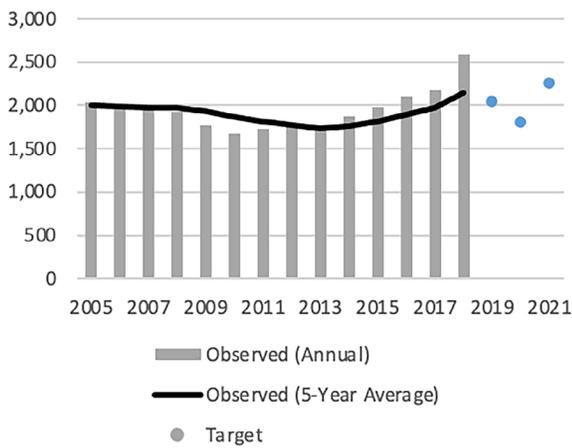
**Figure 21. Number of fatalities**



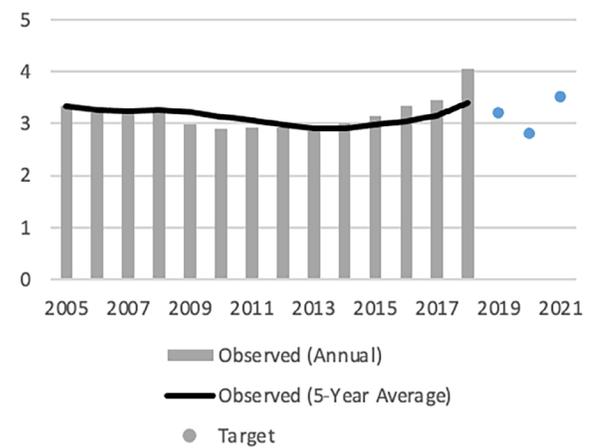
**Figure 22. Fatalities per 100 million VMT**



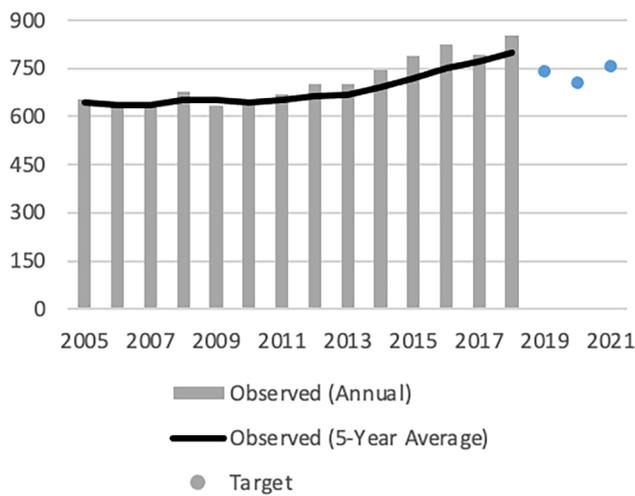
**Figure 23. Number of Serious injuries**



**Figure 24. Serious injuries per 100 million VMT**



**Figure 25. Number of non-motorized fatalities**



## Transit Safety

The Public Transportation Agency Safety Plan Final Rule (49 CFR §673.15), adopted in July 2018, established requirements for public transportation operators, including the requirement to set targets and monitor performance for measures related to the safety of public transit operations. The original compliance deadline for MPOs was July 20, 2020, though the FTA extended the deadline until December 31, 2021 given the unprecedented strain placed on transit operators by the COVID-19 pandemic.

The final rule from FTA established six performance measures to assess progress towards the transit safety goal, defined as such:

**Table 15.** Transit safety performance measures

MEASURE <sup>18</sup>	DEFINITION
Total number of reportable transit fatalities	The total number of people involved in a reportable transit safety event with an outcome of fatality by mode.
Reportable transit fatalities per revenue mile by mode	The total number of people involved in a reportable transit safety event with an outcome of fatality, divided by the number of revenue vehicle miles provided within the nine-county Bay Area by mode.
Reportable transit injuries per revenue mile by mode	The total number of people involved in a reportable transit safety event with an outcome of injury by mode.
Total number of reportable transit safety events by mode	The total number of people involved in a reportable transit safety event with an outcome of injury, divided by the number of revenue vehicle miles provided within the nine-county Bay Area by mode.
Reportable transit safety events per revenue mile by mode	The total number of reportable transit safety events by mode.
Mean distance between major mechanical failures by mode	The total number of major mechanical failures divided by the total number of revenue vehicle miles provided within the nine-county Bay Area by mode.

With Plan Bay Area 2050 slated for adoption in fall 2021, MTC will not yet have set targets for transit safety. MTC will report on performance in the next update to the regional plan.

<sup>18</sup> The definition of reportable transit fatalities, injuries, and safety events and examples/counterexamples are found in the FTA's 2020 Safety and Security Policy Manual at <https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/ntd/146986/2020-ntd-safety-and-security-policy-manual.pdf>

## Interstate Highway, Non-Interstate Highway and Bridge Condition

The final rule from FHWA established six performance measures to assess performance for infrastructure condition for the Interstate Highway System, the Non-Interstate Highway System, and bridges, defined as such:

**Table 16.** Performance measures for Interstate Highway, Non-Interstate Highway, and bridge condition

MEASURE	DEFINITION
Percentage of pavements on the Interstate System in good condition	The area of Interstate highway pavement where cracking, roughness, and rutting/faulting (in the case of asphalt and jointed concrete) metrics are all rated “good” divided by the total area of Interstate highway pavement.
Percentage of pavements on the Interstate System in poor condition	The area of Interstate highway pavement where cracking, roughness, and rutting/faulting (in the case of asphalt and jointed concrete) metrics are all rated “poor” divided by the total area of Interstate highway pavement.
Percentage of pavements on the non-Interstate NHS in good condition	The area of NHS highway pavement where cracking, roughness, and rutting/faulting (in the case of asphalt and jointed concrete) metrics are all rated “good” divided by the total area of NHS highway pavement.
Percentage of pavements on the non-Interstate NHS in poor condition	The area of NHS highway pavement where cracking, roughness, and rutting/faulting (in the case of asphalt and jointed concrete) metrics are all rated “poor” divided by the total area of NHS highway pavement.
Percentage of NHS bridges by deck area classified as in good condition	The share of NHS deck area with a National Bridge Inventory (NBI) condition rating greater than or equal to 7. Bridges are rated on deck, superstructure, substructure, and culvert, and the NBI rating is the lowest of these items.
Percentage of NHS bridges by deck area classified as in poor condition	The share of NHS deck area with a National Bridge Inventory (NBI) condition rating less than or equal to 4. Bridges are rated on deck, superstructure, substructure, and culvert, and the NBI rating is the lowest of these items.

In the first performance period, State DOTs must establish two-year and four-year numerical targets for pavement condition on the non-Interstate NHS and four-year targets for the Interstate. In the first performance period, State DOTs must also establish two-year and four-year numerical targets for NHS bridge condition. In the following performance periods, State DOTs will be required to establish two-year and four-year numerical targets for all six performance measures. MPOs must support the four-year State targets or set their own regional targets. In 2018, MTC opted to support State targets for these six performance measures.

**Table 17.** MTC baseline performance and state targets for Interstate Highway, Non-Interstate Highway, and bridge condition (2019 and 2021)

	BAY AREA	STATE		
	BASELINE <sup>19</sup>	BASELINE <sup>20</sup>	2019 TARGET	2021 TARGET
Percentage of pavements on the Interstate System in good condition	42.2%	44.9%	45.1%	44.5%
Percentage of pavements on the Interstate System in poor condition	4.5%	3.1%	3.5%	3.8%
Percentage of pavements on the non-Interstate NHS in good condition	13.7%	25.5%	28.2%	29.9%
Percentage of pavements on the non-Interstate NHS in poor condition	7.6%	7.1%	7.3%	7.2%
Percentage of NHS bridges by deck area classified as in good condition	54.5%	66.6%	69.1%	70.5%
Percentage of NHS bridges by deck area classified as in poor condition	7.7%	4.7%	4.6%	4.4%

**SOURCE:** Federal Highway Administration Highway Performance Monitoring System and National Bridge Inventory

MTC regularly programs funding for maintenance and rehabilitation of bridges and highways in support of the State target, though there is no regional numeric target to which to compare more recent performance for these measures at the regional scale.

19 Performance based upon most recently available data at time of target-setting; for pavement condition, year 2016 data is used; for bridge condition, year 2017 data is used.

20 After submitting targets to FHWA, Caltrans identified a calculation error and may submit revised targets to FHWA in the near future. In calculating the Bay Area baseline, MTC staff corrected the calculation error to reflect accurate baseline conditions.

# Transit Asset Management

The transit asset management (TAM) final rule published by FTA in July 2016 established a National TAM System in accordance with MAP-21, as defined below:

**Table 18.** Transit asset management performance measures

ASSET CATEGORY	PERFORMANCE MEASURE
Rolling Stock: All revenue vehicles	Percentage of revenue vehicles within a particular asset class that have either met or exceeded their Useful Life Benchmark (ULB)
Facilities: All buildings or structures and parking facilities	Percentage of facilities within an asset class, rated below condition 3 (fair) on the TERM scale
Infrastructure: Only rail fixed guideway, tracks, signals and systems	Percentage of guideway directional route-miles with performance restrictions
Equipment: Only non-revenue (service) vehicles	Percentage of non-revenue vehicles that have either met or exceeded their ULB

Regional targets are set annually by transit operators in October and the MPO the following April. Transit operators submit data on present asset condition and forecasted future asset condition by asset type through the Regional Transit Capital Inventory (RTCI), a comprehensive regional database of the transit assets that are owned by the transit agencies across the region, developed by MTC to collect consistent and comparable data on the region’s transit capital assets and associated replacement and rehabilitation costs from each operator.

Transit operators estimate the number of assets they will be able to rehabilitate or replace based on anticipated capital revenues available. MTC works with transit operators to establish reasonable expectations for forecasted asset condition, and then rolls up individual operator performance and targets into the regional average included in this report. For transit asset management, MPOs must set regional numeric targets (Table 18).

**Table 19.** MTC transit asset management targets (2021)

ASSET CATEGORY	2020 TARGET	2020 PERFORMANCE	2021 TARGET
Revenue Vehicles	24%	27% (target not met)	21%
Facilities	6%	6% (target met)	10%
Infrastructure	1.3%	1.0% (target met)	1.5%
Non-Revenue Vehicles	52%	47% (target met)	44%

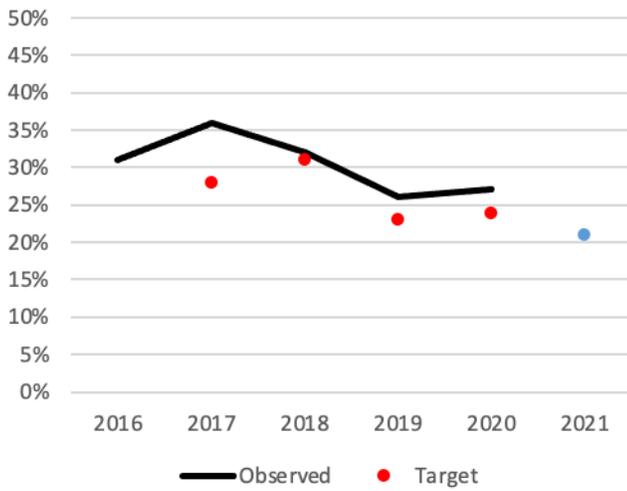
SOURCE: Regional Transit Capital Inventory (RTCI) and operators' targets

The Bay Area met its performance targets for state of good repair for non-revenue vehicles, guideway, and facilities, though it fell short of its target for revenue vehicles:

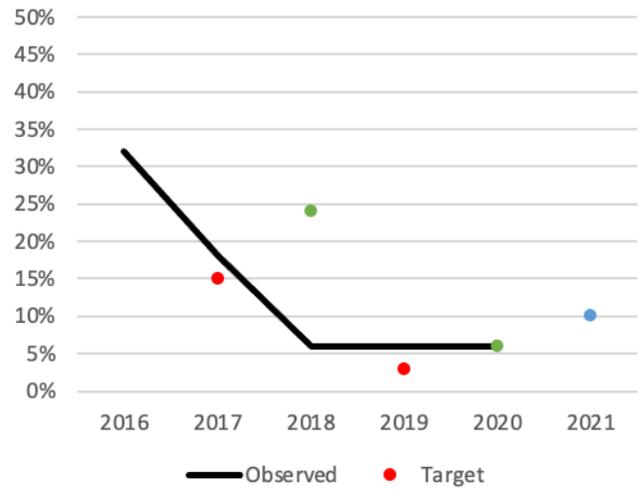
- The share of revenue vehicles not in a state of good repair has decreased over the past four years, though progress stalled between 2019 and 2020 with the share remaining roughly flat and exceeding the target for 2020.
- The share of non-revenue vehicles past their useful life declined in 2020 as well, improving from 56 percent to 47 percent, outpacing the regionwide target of 52 percent for 2020. The 2021 targets for non-revenue vehicle asset condition represent a continuation of this trend.
- Facilities remained in a similar condition between 2019 and 2020, with around 6 percent of facilities scoring below 3 on the TERM facility condition rating scale. This was in line with the target for 2020.
- Finally, the region met its guideway target in 2020; the percentage of route directional miles with speed or operational restrictions remained at 1 percent between 2019 and 2020, below the target share of 1.3 percent. Analysis of funding availability and asset maintenance needs suggests performance may worsen slightly between 2020 and 2021, with a 2021 target of 1.5 percent reflecting that realistic expectation for performance.

MTC's historical performance and targets are shown in Figure 25 through Figure 28.

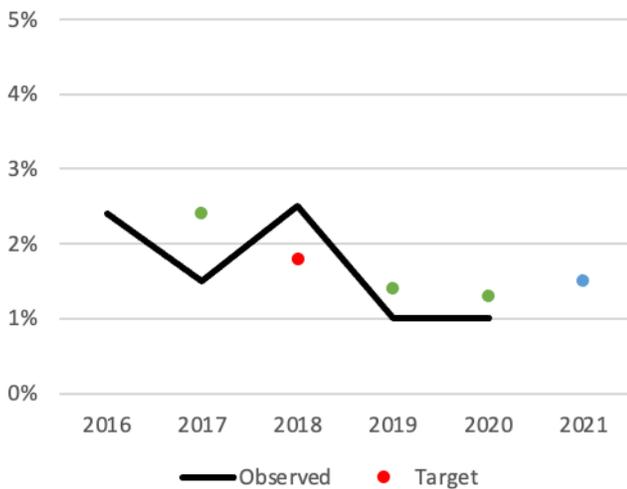
**Figure 26.** Share of revenue vehicles that have exceeded their ULB



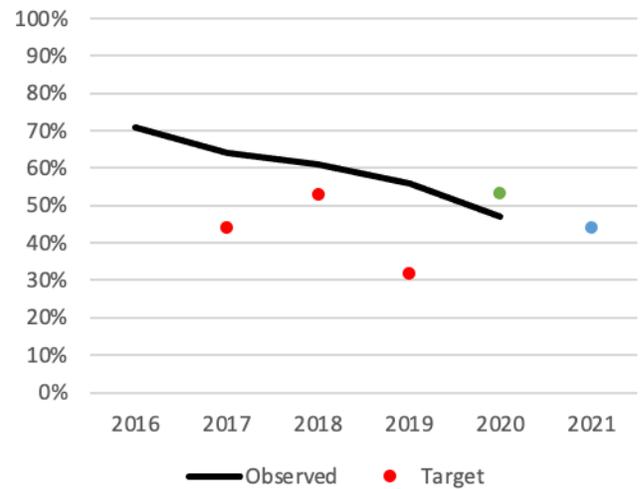
**Figure 27.** Share of facilities with a condition rating below fair



**Figure 28.** Share of guideway route miles with speed restrictions



**Figure 29.** Share of non-revenue vehicles that have exceeded their ULB



## System Reliability

The final rule from FHWA established two performance measures to assess performance for system performance as it relates to the reliability of passenger movement, defined as such:

**Table 20.** Performance measures for passenger system reliability

MEASURE	DEFINITION
Percent of the person-miles traveled on the Interstate that are reliable	Percent of person-miles traveled on the Interstate that are reliable, where reliable is defined as a Level of Travel Time Reliability (LOTTR) metric of below 1.50 during all time periods for a given segment. LOTTR is calculated as the 80th percentile travel time in seconds divided by the 50th percentile travel time in seconds.
Percent of person-miles traveled on the non-Interstate NHS that are reliable	Percent of person-miles traveled on the non-Interstate NHS that are reliable, where reliable is defined in the same way as described above

In the first performance period, State DOTs must establish two-year and four-year numerical targets for reliability on the Interstate and four-year targets for the non-Interstate NHS. In the following performance periods, State DOTs will be required to establish two-year and four-year numerical targets for all three performance measures. MPOs must support the four-year State targets or set their own regional targets. In 2018, MTC opted to support State targets for this performance measure.

**Table 21.** MTC baseline performance and state targets for passenger system reliability (2019 and 2021)

	BAY AREA	STATE		
	BASELINE	BASELINE	2019 TARGET	2021 TARGET
Percent of the person-miles traveled on the Interstate that are reliable	63.3%	64.6%	65.1%	65.6%
Percent of person-miles traveled on the non-Interstate NHS that are reliable	64.7%	73.0%	N/A	74.0%

SOURCE: National Performance Management Research Dataset (NPMRDS)

MTC regularly programs funding to improve the reliability of passenger travel reliability, with an emphasis on optimization over capacity expansion, in support of the State target, though there is no regional numeric target to which to compare more recent performance for these measures at the regional scale.

# Freight Movement and Economic Vitality

The final rule from FHWA established one performance measure to assess system performance for freight movement reliability, defined as such:

**Table 22.** Performance measure for freight system reliability

MEASURE	DEFINITION
Truck travel time reliability (TTTR) index	The sum of the maximum TTTR score for each segment, divided by the total Interstate system miles. TTTR is calculated as the 95th percentile of truck travel time in seconds divided by the 50th percentile travel time in seconds.

State DOTs will be required to establish two-year and four-year numerical targets for this performance measure. MPOs must support the four-year State target or set their own regional target. In 2018, MTC opted to support State targets for this performance measure.

**Table 23.** MTC baseline performance and state targets for freight system reliability (2019 and 2021)

	BAY AREA	STATE		
	BASELINE	BASELINE	2019 TARGET	2021 TARGET
Truck travel time reliability (TTTR) index	2.30	1.69	1.68	1.67

**SOURCE:** National Performance Management Research Dataset (NPMRDS)

MTC regularly programs funding to improve the reliability of freight reliability, with an emphasis on optimization over capacity expansion, in support of the State target, though there is no regional numeric target to which to compare more recent performance for this measure at the regional scale.

# Congestion Reduction

The final rule from FHWA established two performance measures to assess performance for congestion reduction, which are required for regions receiving CMAQ funding, in accordance with MAP-21, defined as such:

**Table 24.** Performance measures for congestion reduction

MEASURE	DEFINITION
Annual hours of peak-hour excessive delay per capita by urbanized area	The number of person-hours per year for which people experience excess delay – defined as travel times below 20 mph or 60 percent of the posted speed limit during peak periods – on the National Highway System, divided by the population of the applicable urbanized area.
Percent of non-SOV travel by urbanized area	Share of commute trips for which the primary mode is not a single-occupant vehicle as defined by the U.S. Census Bureau, including travel avoided by telecommuting.

State DOTs and MPOs must set two-year and four-year numerical targets every four years for each CMAQ measure to comply with the regulation. Unlike most other targets, the state DOT and MPO targets for each urbanized area must be fully consistent. State DOTs must set targets by May, making May the de facto deadline for MPOs as well, given the requirement for consistency. MPOs must set regional numeric targets for these measures.

In the first round of target-setting, conducted in 2018, targets were set for the San Francisco-Oakland Urbanized Area (UA) and the San Jose UA, the two urbanized areas that met the population threshold of 1 million residents. Starting in the second target-setting cycle, targets will be set for these two UAs as well as the Concord, Santa Rosa, and Antioch UAs.

**Table 25.** MTC performance measures for congestion reduction (2020 and 2022)

MEASURE	URBANIZED AREA	BASELINE <sup>21</sup>	TARGET (2020)	TARGET (2022)
Annual hours of peak-hour excessive delay per capita (by urbanized area)	San Francisco-Oakland	31.3	N/A	30.0
	San Jose	27.5	N/A	26.4
	Concord	N/A	N/A	N/A
	Santa Rosa	N/A	N/A	N/A
	Antioch	N/A	N/A	N/A
Percent of non-single-occupant vehicle travel (by urbanized area)	San Francisco-Oakland	44.3%	45.3%	46.3%
	San Jose	24.5%	25.5%	26.5%
	Concord	N/A	N/A	N/A
	Santa Rosa	N/A	N/A	N/A
	Antioch	N/A	N/A	N/A

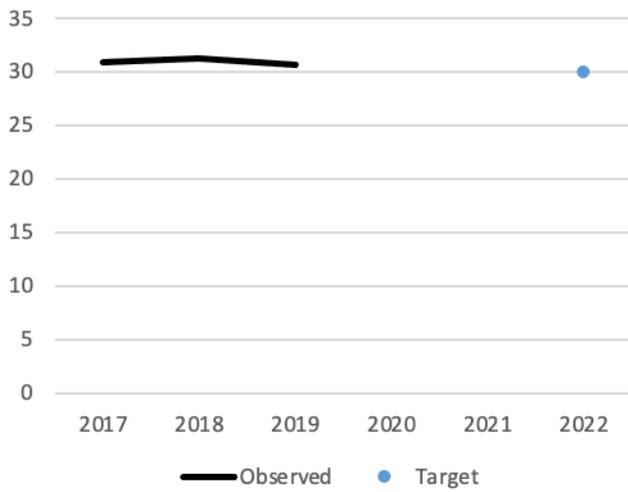
SOURCE: National Performance Management Research Dataset (NPMRDS) and American Community Survey

Data are not yet available for 2020 to compare the MTC region’s performance to its 2020 targets. Likely, the impacts of the COVID-19 pandemic will skew this data favorably toward attainment of targets, given the widespread shelter-in-place guidelines that were in place for much of the year and as such, many more workers telecommuted on a given day than in prior years.

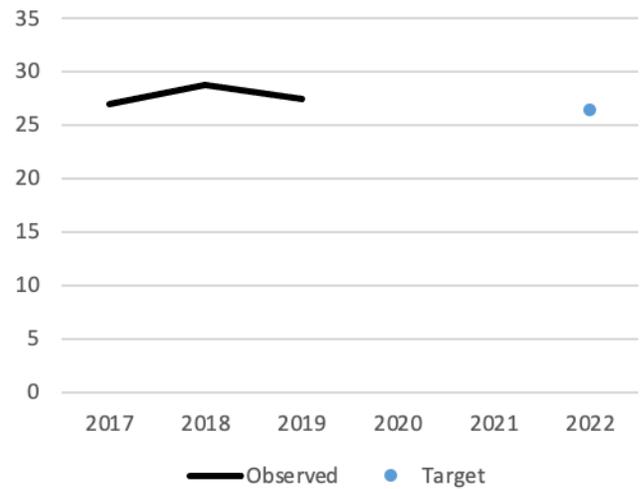
<sup>21</sup> Performance is based upon most recently available data at the time of target-setting; for congestion (peak-hour delay), year 2017 data is used; for mode share, year 2016 data is used.

MTC's historical performance and targets are shown in Figure 29 through Figure 32.

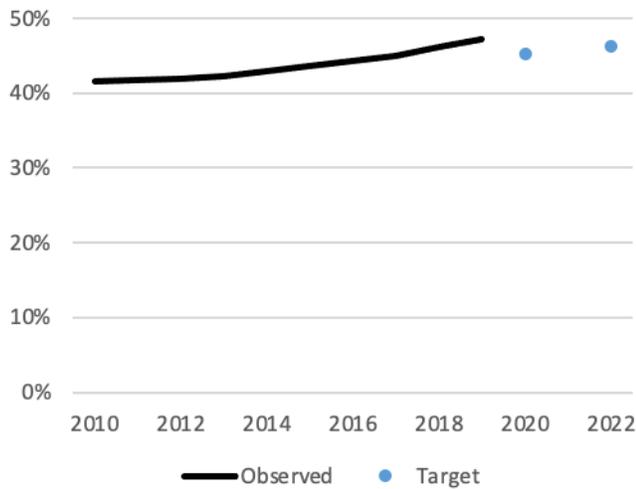
**Figure 30.** Annual hours of peak-hour excessive delay per capita (San Francisco-Oakland UA)



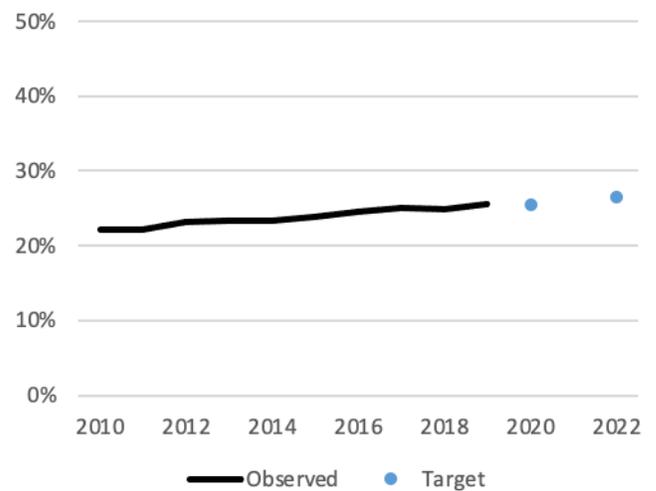
**Figure 31.** Annual hours of peak-hour excessive delay per capita (San Jose UA)



**Figure 32.** Percent of non-single-occupant vehicle travel (San Francisco-Oakland UA)



**Figure 33.** Percent of non-single-occupant vehicle travel (San Jose UA)



# Environmental Sustainability

The final rule from FHWA established one performance measure with multiple sub-parts to assess performance for environmental sustainability, defined as such:

**Table 26.** Performance measures for environmental sustainability

MEASURE	DEFINITION
Total emissions reductions from CMAQ-funded projects by pollutant <ul style="list-style-type: none"> <li>a. PM<sub>2.5</sub></li> <li>b. PM<sub>10</sub></li> <li>c. CO</li> <li>d. VOC</li> <li>e. NO<sub>x</sub></li> </ul>	Total emissions reductions for Carbon Monoxide (CO), Nitrogen Oxides (NO <sub>x</sub> ), Volatile Organic Compounds (VOCs), Particulate Matter (PM <sub>2.5</sub> and PM <sub>10</sub> ) for CMAQ-funded projects in designated nonattainment and maintenance areas in kilograms per day.

Federal regulation requires MPOs with nonattainment and maintenance areas that overlap with an urbanized area with a population greater than one million set their own two-year and four-year regional targets for this performance measure. MPOs that do not meet this description have the option of supporting four-year State targets or setting quantifiable regional four-year targets every four years. Performance is calculated using the cumulative 2-year and 4-year reported daily emissions reductions for all projects funded by CMAQ and all applicable criteria pollutants and precursors, meaning the 2021 target is the sum of daily reductions for projects implemented between the years 2018 and 2021.

The targets summarized below are based on the results of MTC's emissions reductions model, which accounts for projects within the CMAQ pipeline and vehicle fleet characteristics, among other factors. An advantage of this target-setting approach is the clear connection between current and planned investments and the associated reduction in emissions.

**Table 27.** MTC performance targets for environmental sustainability (2019 and 2021)

MEASURE	BASELINE <sup>22</sup>	TARGET (2019)	TARGET (2021)
Total emissions reductions from CMAQ-funded projects by pollutant (PM <sub>2.5</sub> )	24.50	8.66	30.0
Total emissions reductions from CMAQ-funded projects by pollutant (PM <sub>10</sub> )	31.29	10.99	26.4
Total emissions reductions from CMAQ-funded projects by pollutant (CO)	31,046.04	8,373.38	N/A
Total emissions reductions from CMAQ-funded projects by pollutant (VOC)	2,248.93	528.31	N/A
Total emissions reductions from CMAQ-funded projects by pollutant (NO <sub>x</sub> )	2,179.66	557.61	N/A

<sup>22</sup> Performance is based upon most recently available data at the time of target-setting (2014-2017); 2019 target is the expected emissions reduction per day for federal fiscal years 2018 and 2019; 2021 target is expected emissions reduction per day for federal fiscal years 2019 through 2021.

As was reported in MTC’s Mid-Performance Report submitted to FHWA in September 2020, emissions reductions from CMAQ projects over the period 2018 to 2019 have been significant. For all pollutants, the estimated emissions reductions exceeded the two-year performance targets, as summarized in Table 27. Near-term performance can be attributed to both the early programming of effective air quality-improving projects as well as the omission of several CMAQ-funded projects that were programmed and obligated in 2018 and 2019 that may not have been anticipated during the target-setting process. Continued reductions in CO and VOCs will be needed to meet the four-year targets.

**Table 28.** MTC mid-point performance for environmental sustainability targets

EMISSIONS REDUCTIONS FROM CMAQ-FUNDED PROJECTS	PERFORMANCE		TARGETS	
	BASELINE (2014-2017)	2-YEAR PROGRESS (2018-2019)	2-YEAR TARGETS (2018-2019)	4-YEAR TARGETS (2018-2021)
PM <sub>2.5</sub>	24.50	36.43	8.66	16.53
PM <sub>10</sub>	31.29	58.95	10.99	21.00
CO	31,046.04	9,018.55	8,373.38	14,963.60
VOC	2,248.93	697.69	528.31	897.70
NO <sub>x</sub>	2,179.66	1,116.98	557.61	962.58

# Alignment of Recent Investments and Policies with Federal Targets

Recent local policies and investments throughout the Bay Area support near-term progress toward the goal areas outlined in the federal guidance. Through the Transportation Improvement Program (TIP), MTC has programmed \$10.3 billion toward 350 discrete transportation projects throughout the region, with a clear connection between near-term investments and performance targets. These investments, to be made over the period FY2020-21 through FY2023-24, combined with complementary policies enacted at the local, county or regional level, are designed to support attainment of regional and state goals.

## Safety

Over the past four years, the Bay Area has made significant advancements toward supporting safer transportation through policies and investments. MTC passed Resolution 4400 in June 2020, adopting a regional Vision Zero policy for the region. In accordance with this vision, MTC set road safety targets based on a linear reduction to zero fatalities and serious injuries in the region by the year 2030 in 2019, 2020 and 2021. A number of local jurisdictions in the Bay Area have also adopted Vision Zero policies, including the region's three largest cities of San Jose, San Francisco and Oakland, as well as a number of smaller jurisdictions. In order to move the region toward registering zero road fatalities or serious injuries, MTC plans to embark on a multi-pronged effort, offering regional leadership on safety, providing high-quality safety data to local jurisdictions, prioritizing equity, and supporting policies and legislation beneficial to safety.

The 2021 TIP allocates more than \$1 billion in funding toward projects that have a primary purpose of improving roadway or transit safety. This accounts for 10% of funding and 22% of projects in the TIP. Several example projects to improve safety funded in the TIP include:

- Caltrain Rengstorff Grade Separation in Mountain View
- Iron Horse Trail Bike and Pedestrian Overcrossing in Contra Costa County
- Powell Street Safety Improvements in San Francisco
- Better Bikeway San Jose – San Fernando Street in Santa Clara County
- SFMTA Train Control and Trolley Signal Rehabilitation/Replacement in San Francisco

## Infrastructure Condition

The 2021 TIP allocates \$785 million toward projects that would improve pavement condition on the non-Interstate NHS and \$1.8 billion toward projects that would improve bridge conditions on the NHS.

The 2021 TIP identifies \$300 million in funding for transit asset maintenance. In total, over 25% of all funds in the TIP are dedicated to maintenance of the region's roads, bridges and transit assets.

Projects contributing toward infrastructure condition improvement within the TIP include:

- Concord BART Station Modernization in Concord
- NVRTA Vine Transit Bus Maintenance Facility in Napa County
- SFMTA Light Rail Vehicle Procurement in San Francisco

## System Reliability, Freight Movement and Economic Vitality

Nearly \$2.7 billion in 2021 TIP funding is invested in projects that are expected to improve system reliability on the Interstate, with another \$2.7 billion in projects identified to improve system reliability on the non-Interstate NHS. This includes both transit projects that seek to reduce overall road usage, particularly during periods of peak delay, as well as road maintenance and optimization approaches.

\$2 billion in 2021 TIP funding to support the reliability of freight movement is also identified. Truck reliability is also improved from projects that benefit all Interstate and non-Interstate travelers.

Projects contributing to system reliability, freight movement and economic vitality within the TIP include:

- BART Berryessa to San Jose extension in Santa Clara County
- Bay Area Toll Authority (BATA)'s Toll Bridge Rehabilitation and Maintenance programs in various counties
- I-880/Industrial Parkway West Interchange in Alameda County
- I-80/I-680/SR-12 Interchange Phase 2A in Solano County

## Congestion Reduction

The 2021 TIP includes over \$2.6 billion in investments in projects that are intended to improve congestion throughout the region. Around half of those funds are directed to projects located within the San-Francisco-Oakland or San Jose urban areas. An additional 30% of those funds are programmed to projects that aim to improve congestion in more than one urban area. In total, 26% of funds programmed in the TIP are directed toward congestion relief projects.

Projects funded through the 2021 TIP take a multimodal approach to congestion relief, with improvements to the region's roads and transit networks receiving funding. Projects contributing toward congestion reduction within the TIP include:

- BART Bay Fair Connection in Alameda County
- SR-12/SR-29/SR-221 (Soscol Junction) Interchange Improvements in Napa County
- Caltrain Electrification in various counties

## Environmental Sustainability

Given that this performance measure speaks specifically to emissions reductions from CMAQ-funded projects, the funding assigned in the 2021 TIP is of a much smaller magnitude, as the TIP allocates funding across the full spectrum of sources. \$35 million in CMAQ funds are programmed for the first time during the 2021 TIP.

- CMAQ-funded projects contributing to environmental sustainability within the TIP include:
- West San Carlos Urban Village Streets Improvements in San Carlos
- Ralston Avenue Corridor Bike-Pedestrian Improvements in Belmont
- Monument Boulevard Class I Path in Concord

# How Does Plan Bay Area 2050 Advance Federal Targets?

Plan Bay Area 2050 advances the federal identified goal areas of safety, infrastructure condition, system reliability, freight movement and economic vitality, congestion reduction and environmental sustainability. While forecasting the MTC region's specific performance in 2050 was not feasible due to model limitations, a qualitative assessment illustrates how the strategies interface with the federal vision.

## Safety

Safety is a primary focus for MTC today and through 2050. Supporting the recently adopted MTC Regional Vision Zero Policy, near-term investments in active transportation infrastructure are projected to significantly increase through 2050, providing safer facilities for cyclists and pedestrians like enhanced crosswalks and more Class IV protected bike lanes. Plan Bay Area 2050 also envisions speed limit reductions on freeways and local roads, which is demonstrated to reduce the total number of fatalities and serious injuries in the region compared to a No Project scenario.

For transit safety, investments in maintaining the region's transit assets through rehabilitation and replacement is likely to result in fewer major mechanical errors and major transit safety events like fires, and fewer fatalities and injuries as a result. Grade separations on the Caltrain system in preparation for California High-Speed Rail service would further reduce rail-involved collisions, improving performance in this regard.

## Infrastructure Condition

MTC has taken a "Fix It First" approach to planning for transportation investments for years, ensuring that requisite funding to maintain all transportation assets – including transit assets, roads and bridges – in a state of good repair similar to today is reserved in the fiscally-constrained transportation project list. Around two-thirds of all transportation revenues are dedicated to operating and maintaining our existing system. This includes the funding needed to maintain all transit revenue vehicles, non-revenue vehicles, facilities and guideway, suggesting that condition would remain roughly constant to today's levels. For Interstate and Non-Interstate highway pavements and bridges, MTC's transportation revenue forecast indicates funding from California's State Highway Operation and Protection Program (SHOPP) would exceed the funding needed to maintain the region's highway pavements, suggesting that conditions may improve beyond today's performance.

## System Reliability, Freight Movement, and Economic Vitality

MTC's Travel Model 1.5 simulates transportation patterns for a typical weekday in the Bay Area. In practice, quantifying reliability requires multiple days of observation to understand variability in travel times, making a quantitative assessment of reliability trends by 2050 infeasible.

Investments included in Plan Bay Area 2050 are likely to have a positive impact on reliability of passenger and freight movement. The highway maintenance outcomes summarized above would have a positive impact due to fewer potholes or other infrastructure failures. Strategies like per-mile tolling on select freeways with transit alternatives are estimated to limit congestion, as shown in analysis of how travel times changed between 2015 and 2050, described in Chapter 5 of this report. Several investments specifically targeting freight movement, including upgrades to the truck scales along I-80 in Solano County and freight-oriented road reconfigurations near the Port of Oakland would also improve the reliability of freight travel in the region by 2050.

## Congestion Reduction

Horizon analysis suggested that congestion is likely to be a growing challenge for the Bay Area leading out to 2050 under varying levels of population growth, autonomous vehicle adoption, economic vitality and other conditions. As such, Plan Bay Area 2050 takes a multi-pronged approach to managing congestion through strategies like per-mile tolling on select freeways with transit alternatives; transit fare integration and means-based discounts; expansion of transportation demand management initiatives; expansion of sustainable commute targets for major employers; and investments in transit and active transportation facilities. Road capacity expansion is very limited, focusing instead on optimization and investments in alternative modes as means to address congestion in the region.

With all Plan Bay Area 2050 strategies in place, analysis suggests that the share of non-single-occupancy vehicle commutes across the region would increase to 67% by 2050, a significant improvement over patterns in the urbanized areas mandated for assessment under federal regulations. Person hours of excessive delay, the other metric for this goal area, would likely also be reduced as more people choose modes other than single-occupancy vehicles. On the most congested segments in the region, improvements to address congestion through optimization like ramp-metering, bus only lanes and more – all part of the Bay Area Forward strategy – as well as an optimized Express Lanes network that allows cars and Express Buses to bypass congestion, would also assist with performance regionwide.

## Environmental Sustainability

The performance measure for environmental sustainability relates to emissions reductions specifically examines emissions reductions brought about by CMAQ-funded projects. As Plan Bay Area 2050 does not attribute individual projects to individual funding sources, determining how emissions reductions would change is not feasible. However, in the greater spirit of environmental sustainability as a goal area, emissions of the five specified pollutants are projected to decrease when compared to today's levels as vehicle fleet turnover and increased electric vehicle adoption, supported by Plan Bay Area 2050's investments in electric vehicle incentives, results in a cleaner, lower-emissions fleet.

# Appendix 1 | Project Performance Methodology

## APPENDIX 1

METROPOLITAN TRANSPORTATION COMMISSION  
ASSOCIATION OF BAY AREA GOVERNMENTS

## M E M O R A N D U M



TO: Regional Advisory Working Group

DATE: Nov 6, 2018

FR: Anup Tapase

REV: November 1, 2019

RE: Horizon/Plan Bay Area 2050: Revised Project Performance Assessment Methodology

### Background

This memorandum presents the revised methodology for evaluating transportation project performance for Horizon and Plan Bay Area (“PBA”) 2050. The methodology leverages the framework used in PBA (2013) and PBA 2040 (2017) and builds on feedback received during the last planning cycle. Staff sincerely appreciates the detailed feedback on the first draft provided by stakeholders since the August 2018 RAWG meeting. The methodology has been updated to reflect this feedback, and responses to specific comments are included in the last attachment.

### Project Performance Methodology Overview

The project performance assessment for Horizon/PBA 2050 will evaluate three primary types of transportation projects: capacity-increasing investments, operational strategies, and resilience projects to address sea level rise and seismic hazards. Committed projects - those that have full funding plans and environmental clearance - are exempt from project performance and will be included in the baseline no-project scenario (“existing + committed”) network. Uncommitted projects previously evaluated during PBA 2040 - with total costs greater than \$250 million<sup>1</sup> - and new project submissions from County Transportation Agencies (CTA), public agencies, non-governmental organizations (NGO) and the public with total costs greater than \$1 billion<sup>1</sup>, will be evaluated during Horizon. Other new project submissions with total costs greater than \$250 million will also be evaluated, following the Request for Regionally-Significant Projects, using the same evaluation methodology.

Projects will be evaluated through the following assessments:

1. **Benefit-Cost Assessment** - primary assessment
  - Compares societal benefits against anticipated project costs
  - Explores project performance against all three Horizon “futures” (“what if” scenarios)
  - Includes supplemental analyses of confidence & sensitivity (similar to PBA 2040)
2. **Guiding Principles Assessment** - secondary assessment
  - Evaluates alignment with the five Guiding Principles using specific project-focused criteria
3. **Equity Assessment** - secondary assessment
  - Examines distributive impacts of project-level accessibility benefits across income groups in all three Horizon “futures”
  - Determines if transportation investments have the potential to benefit residents in Communities of Concern (geographic assessment)

All three assessments seek to evaluate impacts of projects on the Bay Area and bring to light information that will be used to develop the investment strategy of PBA 2050. The framework to prioritize projects based on the findings of the assessments will be discussed by the Planning Committee in Fall 2019/Winter 2020.

### 1. Benefit-Cost Assessment Methodology

The Benefit-Cost Assessment will leverage Travel Model 1.5<sup>1</sup> to quantify benefits of transportation projects. Travel Model 1.5 is an activity-based model that simulates travel decisions over a typical workday for the entire Bay Area in the horizon year of 2050. Benefits (or disbenefits) of the project relative to a baseline no-project scenario will be determined for each of the three futures,

reflecting different external forces, control totals, and land use patterns. The ‘cost’ of each project will represent lifecycle costs. Staff has made several enhancements to the methodology this cycle given its primary role in the assessment.

**Major Enhancements (refer to Attachment A)**

- **Safety:** Incremental to the PBA 2040 approach, benefits of specific operational improvements that were not previously captured, such as interchange or street design improvements, will be estimated using crash reduction factors compiled by FHWA.
- **Natural Lands:** Conversion of natural lands (e.g. wetlands, agricultural land) to infrastructure will be estimated as an annual loss of goods, such as farm products and wood, and services, such as climate regulation and habitat provision, based on a per-acre value.
- **Transit Crowding:** The (dis)benefit of transit crowding relief measures is calculated using an off-model methodology that is based on a ‘crowding penalty factor’. This factor is a multiplier of in-vehicle travel time, based on the load factor at a transit link level and the seated vehicle capacity. The multipliers were aligned with those used by peer agencies in Toronto, London and Los Angeles.

**Benefit Valuation Updates (refer to Attachment B)**

- **Accessibility:** Similar to PBA 2040, the project performance assessment will utilize the travel model’s logsum outputs. Logsum is a metric that measures utility or consumer surplus, and captures mobility benefits (i.e., travel time savings, in-vehicle or out-of-vehicle), travel costs (i.e., tolls, fares, parking, vehicle operating) and the ease of consumers to reach destinations of their choice. These benefits collectively will be termed as “accessibility benefits” this cycle, consistent with the estimation methodology. Logsums can be directly converted to hours and monetized using a consistent value of time for all income classes, acknowledging the implicit judgment that the accessibility is valued the same for all people.
- **Updates to Reflect Future-Specific Income Distributions:** Valuation of time continues to follow USDOT guidance at 50% of median wage rate. However, wages differ in the three futures. Percentage changes in the median wage rate for each future is estimated based on the output of different income distributions from the regional economic model. As a result, the three Futures have different values of time, ranging from \$12.10 to \$17.90 per hour (2018\$). Similarly, auto operating costs also vary by future, ranging from \$0.10 to \$0.40 per mile.
- **Travel Time Reliability:** The valuation this cycle incorporates the latest research which indicates a slightly lower ratio against value of time is appropriate for motorists and a higher ratio is appropriate for freight, when compared to PBA 2040 valuations.
- **All Other Benefits:** Minor updates have been made to valuations for all other benefits from PBA 2040; no benefits are proposed for removal.

**Cost Estimation Updates (refer to Attachment C)**

- **Lifecycle Costs:** Costs will be divided into four categories: initial capital investment costs (including planning, design and environmental), annual O&M costs, asset replacement costs over the analysis period and a residual asset value added back at the end of the period. While project sponsors submit cost estimates, all projects will undergo a high-level cost review by an independent cost consultant using a uniform methodology.
- **Transfers:** Transit revenues, tolls and parking fees are considered transfers that are neither a net economic benefit nor cost to society, and hence they are not included within the benefit-cost framework as per best practice. In PBA 2040, these transfers were eliminated from the benefits. This approach will be standardized across the costs as well.

**Benefit-Cost Ratio Calculation Methodology Updates (refer to Attachment D)**

- **Present Value Approach:** Present values of a stream of benefits and costs will be used to calculate a benefit-cost ratio, rather than using benefits and costs in the horizon year as in

PBA 2040. This approach can capture advantages of quicker construction and implementation timelines, and long-term benefits of large investments. Forecasting streams of benefits and costs requires various assertions and assumptions that have been detailed in the attachment.

### *Supplemental Assessments (refer to Attachment E)*

- **Minor Updates:** Confidence and sensitivity analyses will be conducted, as in PBA 2040, with updates to the criteria that are used. The present value approach will eliminate the need for confidence assessment of timeframe inclusiveness, but calls for new criteria in the sensitivity analysis based on construction timelines, analysis period, discount rate and safety benefits from AVs.

### **2. Guiding Principles Assessment (refer to Attachment F)**

The Guiding Principles Assessment relies solely on qualitative criteria and seeks to ensure that projects align with five Guiding Principles that reflect core aspirations for the Bay Area - to create a region that is **Affordable, Connected, Diverse, Healthy, and Vibrant**. Specific questions were defined to evaluate projects against each principle, focusing on significant negative impacts associated with the project itself, rather than the performance of the jurisdiction(s) where the project may be located. Staff integrated feedback that was received during June RAWG and August RAWG, including additional clarity on evaluation questions. For example, an exception would be made for projects increasing travel times if they have significant safety benefits.

### **3. Equity Assessment (refer to Attachment G)**

While the geographical assessment of the PBA 2040 equity assessment will be maintained, an equity score was developed to lend insight into which income groups benefit most from the project's quantified accessibility benefits. The equity score calculates the ratio of accessibility benefits experienced by a low-income person (defined in the model as a person with annual household income <\$90K in 2019 dollars) to the sum of accessibility benefits experienced by persons of all income groups. There are three scores a project can get: Advances Equity, when this ratio is over 60%; Even Distribution of Benefits, when the ratio is between 40-60%; and Challenges Equity, when the ratio is less than 40%.

### **Next Steps**

Next steps for the evaluation process include:

- **Nov/Dec 2018:** code existing and committed projects in Travel Model 1.5; finalize modeling details of projects to be evaluated; conduct cost review of projects
- **Winter/Spring 2019:** test Travel Model 1.5 and conduct runs for no-project scenario
- **Spring/Summer 2019:** begin project runs using Travel Model 1.5

### **Attachments**

- **Attachment A: Benefits Estimation Methodology**
- **Attachment B: Benefit Valuations**
- **Attachment C: Costs Estimation Methodology**
- **Attachment D: Benefit-Cost Ratio Calculation Methodology**
- **Attachment E: Supplemental Assessments to Benefit-Cost Assessment**
- **Attachment F: Guiding Principles Assessment**
- **Attachment G: Equity Assessment**
- **Attachment H: Responses to Feedback Received since August 2018 RAWG**

1. Travel Model documentation is available here and it is continuously updated with model enhancements: <https://github.com/BayAreaMetro/modeling-website/wiki/TravelModel>
2. Cost figures refer to capital as well as O&M costs, in year of expenditure dollars, up to the horizon year 2050.

## Attachment A - Benefits Estimation Methodology

### Benefits Estimation

Benefit estimation will leverage Travel Model 1.5, an activity-based model that simulates travel decisions over a typical workday for the entire Bay Area in the horizon year of 2050. Travel Model 1.5 attempts to capture effects of transit crowding, TNCs, autonomous vehicles (AVs) and sea level rise, which are all new enhancements since its previous version Travel Model One that was used in PBA 2040. Benefits (or disbenefits) of the project relative to a baseline no-project scenario will be determined using outputs from this model for each of the three futures, reflecting different external forces, control totals, and land use patterns. Effects of Sea Level Rise and Earthquakes will be excluded from the baseline no-project scenarios for all projects except Resilience projects, so as to not bias any projects that may be located in the impact area. Table A.1 captures all the benefits/disbenefits that are estimated and the methodology for doing so.

**Table A.1 Methodology for Estimating Project Benefits**

Benefits / Disbenefits	Includes	Methodology	Accrual	Data sources
<b>Accessibility</b> <sup>1,2</sup> (logsums, expressed in hours/dollars)	<ul style="list-style-type: none"> <li>• Travel time savings                             <ul style="list-style-type: none"> <li>○ Across all modes (auto, TNC, truck, transit, bike, ped)</li> <li>○ Free-flow time and recurring delay</li> <li>○ Includes in-vehicle and out-of-vehicle time (waiting, transfer)</li> </ul> </li> <li>• Travel costs                             <ul style="list-style-type: none"> <li>○ Tolls, fares, parking fees<sup>3</sup></li> <li>○ Vehicle operating costs (fuel, maintenance, repair)</li> </ul> </li> </ul>	<p><b>[Same methodology as PBA 2040, change in nomenclature]</b></p> <p>Accessibility is a measure of how easily people are able to get to the destinations of their choice.</p> <p>Change in accessibility at the individual level is measured using the logsum methodology in Travel Model 1.5. Logsum represents the consumer surplus that results from a given set of choices available to an individual. The aggregate of logsum measures across individuals measures the total change in the consumer surplus due to the project, representing accessibility benefits of the project.</p>	Increase in logsums, which can be converted to a dollar value, is accrued as a positive benefit	Travel Model 1.5
<b>Travel Time Reliability</b> (hours)	<ul style="list-style-type: none"> <li>• Auto travel time reliability</li> <li>• Freight travel time reliability</li> </ul>	<p><b>[Same methodology as PBA 2040 + decrease in incident delay due to AVs]</b></p> <p>Number of hours lost due to unreliable travel time is measured as the sum of incident delay across all roadways. Incident delay is calculated as a function of volume-to-capacity ratio and number of lanes on a roadway.</p> <p>Assumptions on safety benefits that may result from AVs in the fleet are detailed in the endnotes<sup>6</sup>. This will consequently impact incident delay.</p>	Increase in hours is a negative benefit	Travel Model 1.5
<b>Transit Crowding</b>	<ul style="list-style-type: none"> <li>• Disbenefit associated with traveling in crowded transit</li> </ul>	<p><b>[New (dis)benefit that was not considered in PBA 2040]</b></p> <p>People experience a higher value of time when travelling in crowded transit, and</p>	Increase in crowded penalty hours is a	Travel Model 1.5, Metrolinx, DfT

Benefits / Disbenefits	Includes	Methodology	Accrual	Data sources
		<p>hence there is an associated disbenefit. While Travel Model 2 is able to account for this higher value of time, Travel Model 1.5 is not. Hence this benefit was estimated with an off-model methodology, using a ‘crowding penalty factor’.</p> <p>The crowding factor is a multiplier of in-vehicle travel time, calculated using a formula at the transit link level, and based on the load factor on the particular link. The formula is detailed in the endnotes<sup>4</sup>. The difference between the in-vehicle travel time multiplied by the crowding factor with and without the project represents the (dis)benefit of the project with respect to crowding relief.</p> <p>Projects can bring about crowding relief by increasing service frequency or the seated capacity, or providing alternate travel paths to existing crowded paths. However, a project may have an unintended effect of crowding disbenefit if it increases attractiveness of a transit option (e.g. extension of a rail line) but does not tie this with measures to relieve crowding (e.g. increase service frequency).</p>	negative benefit	
<p><b>Collisions</b></p> <p>(number of victims for fatality/ injury, number of collisions for PDO)</p>	<ul style="list-style-type: none"> <li>• Fatalities due to collisions</li> <li>• Injuries due to collisions</li> <li>• Property damage only (PDO) collisions</li> </ul>	<p><b>[Same methodology as PBA 2040 + new methodology to capture benefits from specific safety improvements + safety benefits from AVs]</b></p> <p>Change in the number of collisions due to a project is calculated by multiplying the change in VMT (by area type (urban/rural), facility type, and number of lanes) with an estimate of number of collisions by type per VMT. These include transit and bike/ped related collisions. Incremental to the above change, the reduction in number of collisions due to specific safety improvements is estimated separately, since the VMT method does not capture such benefits. This is based on a crash reduction factors (CRF), sourced from research compiled by FHWA. Methodology and CRFs for specific safety improvements are detailed in the endnotes<sup>5</sup>.</p> <p>Further, assumptions on safety benefits that may result from AVs in the fleet are detailed in the endnotes<sup>6</sup>.</p>	Increase in number of victims / collisions is a negative benefit	Travel Model 1.5, SWITRS, CMF Clearinghouse (FHWA)

Benefits / Disbenefits	Includes	Methodology	Accrual	Data sources
<b>GHG Emissions and Air Quality</b> (metric tons)	<ul style="list-style-type: none"> <li>• CO<sub>2</sub> (global social effects)</li> <li>• Air pollutants (negative health effects)                             <ul style="list-style-type: none"> <li>○ PM<sub>2.5</sub></li> <li>○ Other volatile organic compounds (e.g. NO<sub>x</sub>, SO<sub>2</sub>, Acetaldehyde, Benzene)</li> </ul> </li> </ul>	<p><b>[Same methodology as PBA 2040]</b></p> <p>Change in emissions is measured as the sum of VMT, multiplied by an estimate of future emission levels per VMT forecasted by EMFAC. These estimates depend on time period of the day, vehicle class (including electric vehicles) and speed.</p> <p>The emission level would be zero in the case of electric vehicles (EVs), and hence futures with higher levels of EV adoption will have significantly lower levels of emissions benefits. Assumptions on EV penetration are detailed in the endnotes<sup>7</sup>.</p>	Increase in metric tons is a negative benefit	Travel Model 1.5, EMFAC
<b>Benefits from Physical Activity<sup>9</sup></b> (active individuals and premature deaths)	<ul style="list-style-type: none"> <li>• Morbidity benefits from increased walking/cycling</li> <li>• Mortality benefits from increased walking/cycling</li> </ul>	<p>Morbidity benefits: Health care cost savings for every new ‘active’ individual. An active individual is considered to be one that walked (including to/from transit) and/or biked for 30 minutes a day<sup>8</sup>.</p> <p>Mortality benefits: Risk reduction of mortality of 11% for walking and 10% for bicycling for ‘active’ individuals, applied to Bay Area mortality rates.</p>	Increase in active individuals and decrease in premature deaths is a positive benefit	Travel Model 1.5
<b>Noise (VMT)</b>	<ul style="list-style-type: none"> <li>• Impact of change in noise levels due to change in auto/truck VMT</li> </ul>	<p><b>[Same methodology as PBA 2040]</b></p> <p>Change in VMT due to the project, by auto and truck</p>	Increase in VMT is a negative benefit	Travel Model 1.5
<b>Auto Ownership (vehicles)</b>	<ul style="list-style-type: none"> <li>• Change in number of vehicles induced by project</li> </ul>	<p><b>[Same methodology as PBA 2040]</b></p> <p>Predicted change in the number of vehicles owned by households, based on VMT and household demographics</p>	Increase in vehicles represents higher ownership costs and is a negative benefit	Travel Model 1.5
<b>Loss of Natural Land</b> (acres)	<ul style="list-style-type: none"> <li>• Loss of natural land that is converted to transportation infrastructure, by land type:                             <ul style="list-style-type: none"> <li>○ Wetland</li> <li>○ Forestland</li> <li>○ Pastureland</li> <li>○ Farmland</li> </ul> </li> </ul>	<p><b>[New disbenefit that was not considered in PBA 2040]</b></p> <p>Estimation of the land area impacted by a project is based on the methodology used in EIR project footprint analyses - 100ft buffer around linear projects (e.g. road/rail extensions) and 150ft - 500ft buffer from center of point projects (e.g. interchanges, transit centers), depending on the size of the project.</p> <p>The type of land converted is determined using the fishnet database sourced from Bay Area Greenprint. Project GIS shapefiles are overlaid on this database,</p>	Increase in acres is a negative benefit	Bay Area Greenprint

Benefits / Disbenefits	Includes	Methodology	Accrual	Data sources
		<p>by which we can obtain number of acres of wetlands, pasture land and farmland impacted. (www.bayareagreenprint.org)</p> <p>This disbenefit would primarily apply to projects in non-urbanized areas, and projects that would have construction impacts on wetlands along the coast.</p>		

Endnotes:

1. A small number of trips are not captured by accessibility logsums - interregional trips (i.e. trips between the Bay Area and other surrounding regions), trips to/from the airports, and freight trips. Impacts of projects on these trips are measured using value of time saved and operating cost savings per VMT.
2. Accessibility is a measure of the ease with which transportation users are able to reach destinations. Improving accessibility is generally accepted as the core objective of transportation investments, since users do not use transportation for the sake of the transportation itself (except in rare cases), but to reach destinations. It represents more than just mobility improvements in terms of travel time. Users, in making travel decisions, take into account not only travel time, but also mode choices available, land use patterns (i.e., destination locations), travel costs, congestion and crowding when making travel decisions. Their decisions are also dependent on their personal characteristics such as age, household income, number of workers/dependents in the household, etc.
3. Tolls, fares and parking fees are an economic transfer between users and operators. They represent neither an economic benefit nor an economic cost of projects, and are hence omitted from benefit-cost framework. Since user travel costs factor into travel decisions, they are part of the accessibility logsums. However, they are added back again for a net zero benefit to society in the calculation of the benefit-cost ratio.
4. The crowding penalty factor (or multiplier to the in-vehicle travel time) is calculated using a formula borrowed from Toronto’s Metrolinx Business Case Guidance (<http://www.metrolinx.com/en/regionalplanning/projectevaluation/benefitscases/Metrolinx-Business-Case-Guidance-Volume-2.pdf>). The formula calculates a crowding factor at the transit link level, which is calculated with and without the project. The inputs from Travel Model outputs into the formula are: person volume, number of seated and standing passengers, and the load factor (calculated using seated vehicle capacity). Coefficients and in-vehicle travel time weights for seated and standing passengers are sourced directly from the Metrolinx Guidance. The multiplier is capped at 2.5, which is aligned with values used by peer agencies including Metrolinx, London’s DfT and LA Metro.

**Equation 5.6:** Calculating crowding impacts

$$Crowding\ Factor = \frac{\left( \gamma_1 + \alpha_1 \left( \frac{V_i}{C_i} \right)^{\beta_1} \right) \times N_{seated} + \left( \gamma_2 + \alpha_2 \left( \frac{V_i}{C_i} \right)^{\beta_2} \right) \times N_{stand}}{N_{seated} + N_{stand}}$$

where

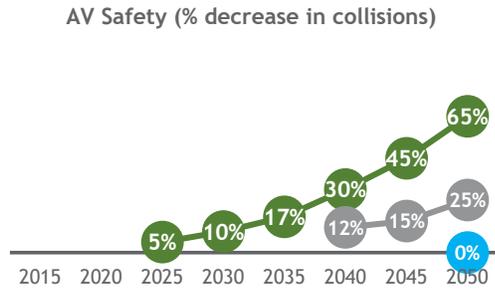
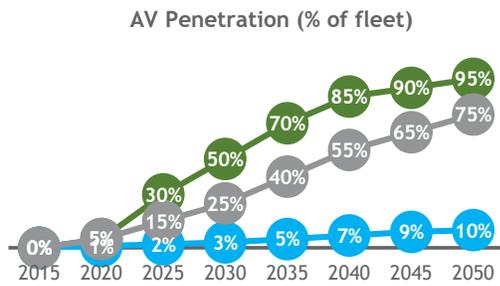
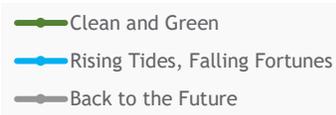
- $V_i$  = transit segment volume;
- $C_i$  = transit segment capacity;
- $N_{seated}$  = number of seated passengers;
- $N_{stand}$  = number of standing passengers;
- $\gamma_1, \gamma_2$  = IVT weights under ideal conditions for seated (1.0) and standing (1.4) passengers;
- $\alpha_1, \alpha_2$  = additional IVT weights at full capacity for seated (0.1) and standing (0.2) passengers; and
- $\beta_1, \beta_2$  = curves for seated (1.4) and standing (3.4) passengers.

5. A finite list of safety improvements, as shown in Table A.2, will be considered for the estimation of reduction in collisions. This list is meant to capture major safety improvements within all projects that are to be evaluated, given that design details of the projects are not readily available. For each of those improvements, the following method is applied. First, the average annual number of collisions within the physical limits of the project site is obtained from SWITRS for the five year period 2012-2016. In the case of transit grade separations, this number was obtained from project sponsors (Caltrain, VTA, SF Muni). This number is then multiplied by a crash reduction factor (CRF) for the specific safety improvement (obtained from CMF Clearinghouse, FHWA) to determine the annual decrease in number of collisions as a result of the project. CRF denotes the percentage reduction in crashes that may be expected as a result of the countermeasure. For more information, please refer to <http://www.cmfclearinghouse.org/fags.cfm#q2>. CRF averages listed in Table A.2 are averaged over multiple data points that are related to the safety improvement and have a rating of 3 stars or higher. The averages are meant to be indicative and are not authoritative estimates.

**Table A.2 Crash Reduction Factors (CRF) by Safety Improvement**  
 (Source: CMF Clearinghouse)

Safety Improvement	CRF average
Freeways: New auxiliary lane addition	20%
Freeways: New lane addition (GP/HOV/Express)	0% (data points indicate both positive and negative effects)
Freeways: Existing HOV to express lane conversion	5%
Freeways: Interchange reconfiguration	40%
Local street design improvements (e.g. transit lanes, bike/ped)	20%
Grade separation of transit	100% (for transit-related crashes only; not based on CMF research)
Change in collisions due to impacts such as <ul style="list-style-type: none"> <li>- increase/decrease in auto miles</li> <li>- mode shift to auto/transit/other modes</li> <li>- decrease in vehicle ownership</li> <li>- speed limit changes (e.g. conversion of arterial to freeway)</li> </ul>	Covered by VMT-based methodology

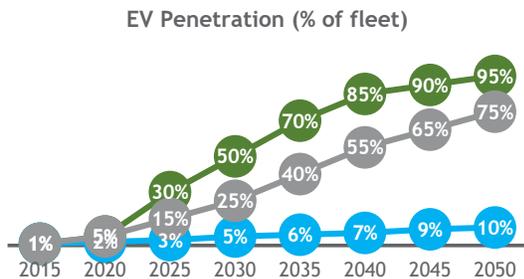
6. Assumptions on AV penetration for each future are shown in the charts below. The assumptions for AV penetration in the horizon year were determined when the three diverging futures were ascertained. This process involved peer exchange, gathering feedback from partners, and developing what-if scenarios. Safety benefits of AVs will be considered in the 'Clean and Green' and 'Back to the Future' futures, where the AV fleet penetration is 95% and 75% by the horizon year, respectively. Safety assumptions are sourced from MTC's Future Mobility Research Program work, including a Delphi survey conducted with subject area experts (40% to 90% reduction in collisions in fully-automated future based on survey results). The trend towards this reduction in collisions is shown below, and is not be assumed to be linear to reflect research on the potential disbenefits of mixing of human/AV fleets.



The methodology recognizes the uncertainty in the safety assumptions and the potential for greater safety with AVs, as anticipated by various agencies. The assumptions will be tested for sensitivity (by increasing the 2050 percent decrease in collisions to 90% in Clean and Green, 10% in Rising Tides, Falling Fortunes and 40% in Back to the Future, and adjusting preceding years concomitantly).

These safety impacts also affect the estimation of travel time reliability benefits. Travel time reliability is measured by non-recurring delay, whose estimates are based on a function of traffic volumes and the level of congestion (volume-over-capacity ratio) for links containing a specified number of lanes. Given the decrease in the collision rate with AVs, the non-recurring delay will be adjusted using the same factor.

- Assumptions on EV fleet penetration are shown below. The assumptions for EV penetration in the horizon year were determined when the three diverging futures were ascertained. This process involved peer exchange, gathering feedback from partners, and developing what-if scenarios.



- Source: World Health Organization’s Health Economic Assessment Tool, available online: <http://www.heatwalkingcycling.org/>
- A previous version of this document mentioned a potential new methodology to calculate health benefits from active transportation, using an R-based ITHIM tool that is in development by Neil Maizlish, Visiting Research Scientist, UC Davis. However due to staff time constraints, this methodology could not be tested/implemented.

## Attachment B - Benefit Valuations

This attachment summarizes valuations that will be used to monetize the various benefits described in Attachment A, for the benefit-cost assessment in Horizon and PBA 2050. The valuations are based on a review of recent research and best practices for monetizing benefits from transportation projects. Table B.1 presents the recommended valuations for each benefit category, including a comparison to the PBA 2040 valuation and a description of the basis of the valuation. Benefit valuations that would differ by Future are indicated using CG for Clean and Green, RT for Rising Tides, Falling Fortunes, and BF for Back to the Future.

**Table B.1 - Valuations of Benefits in Horizon Year - PBA 2040 vs. Horizon/PBA 2050**

Category	Benefit	PBA 2040 Valuation (2017\$)	Horizon & PBA 2050 Valuation (2019\$)	Type of Update	What Does The Valuation Include?
Accessibility	<b><u>For trips captured in logsums (majority of trips)</u></b>				
	Accessibility benefits (per hour)	\$12.66	No major external forces \$13.49 CG \$18.95 RT \$12.82 BF \$18.60	Update to futures	Accessibility benefits are interpreted using Value of Time, after converting logsums to hours. This is set at 50% of the median regional wage rate (\$26.19 in 2018; \$26.97 in 2019\$), based on USDOT guidance.  This wage rate would vary by future, due to external forces. Based on a preliminary household income distribution forecasted by the REMI model, ratios were calculated for multiplying with the wage rate in the case of no major external forces, to obtain the wage rate in the three Futures.  <i>Sources: US Department of Transportation; Bureau of Labor Statistics Occupational Employment and Wage 2018</i>
	<b><u>For trips not captured in logsums (only interregional and airport auto trips, freight)</u></b>				
	Auto In-Vehicle Travel Time (per hour)	\$12.66	(same as above row)		Same as above row <i>Sources: US Department of Transportation; Bureau of Labor Statistics Occupational Employment and Wage, 2017</i>
	Truck In-Vehicle Travel Time (per vehicle hour of travel)	\$33.69	No major external forces \$34.21 CG \$48.06 RT \$32.51 BF \$47.19	Updated to reflect multiple futures	The valuation is the total hourly compensation paid to truck drivers. This valuation represents the labor cost of transporting goods on the roadway network, including benefits.  The calculation method for the three Futures is identical to that for Accessibility Benefits. <i>Source: FHWA Highway Economic Requirements System; Bureau of Labor Statistics Occupational Employment and Wage 2018</i>

Category	Benefit	PBA 2040 Valuation (2017\$)	Horizon & PBA 2050 Valuation (2019\$)	Type of Update	What Does The Valuation Include?
	<b>Auto operating costs</b> (per mile)	\$0.3072	No major external forces \$0.20 CG \$0.40 RT \$0.20 BF \$0.10	Updated to reflect multiple futures	<p><i>Note: Auto/Truck operating costs are implicit in the logsum calculation within the Travel Model, and not explicitly used in the valuation of any benefits.</i></p> <p>The operating cost in 2015/2020 is \$0.20 per mile (in 2018\$), which represents the cost users experience in making daily travel decisions, following USDOT guidance. It includes cost of fuel, maintenance and repair, based on forecasted fuel costs and efficiencies in 2050.</p> <p>This cost varies by future based on external forces: CG: cost rises to \$0.40 in 2025 and then stays constant until 2050 RT: cost stays constant at \$0.20 until 2050 BF: cost declines linearly to \$0.10 in 2050</p> <p><i>Source: USDOT, EIA Energy Outlook 2018, AAA Your Driving Costs 2017 Edition</i></p>
	<b>Truck operating costs</b> (per mile)	\$0.8795	No major external forces \$1.00 CG \$1.55 RT \$1.00 BF \$0.70		<p>The baseline operating cost is \$1.00 per mile, which represents the cost carriers experience in making daily travel decisions, following USDOT guidance. It includes cost of fuel, maintenance and repair, and depreciation, based on forecasted fuel costs and efficiencies in 2050.</p> <p>This cost varies by future based on external forces, similar to auto operating costs (depreciation component is held constant).</p> <p><i>Source: USDOT, EIA Energy Outlook 2018, AAA Your Driving Costs 2017 Edition</i></p>
<b>Travel Time Reliability</b>	<b>Auto</b> (per person hour of non-recurring delay)	\$12.66	No major external forces \$10.79 CG \$15.16 RT \$10.25 BF \$14.88	Major Update	<p>This represents the value placed by an auto driver on the consistency of travel times, and measured as a Reliability Ratio * Value of Time. Recent SHRP research has indicated values of 0.3-0.8. The upper limit of 0.8 is used as a conservative estimate, and this is in line with agencies abroad. This is multiplied by the Value of Time calculated above (\$13.49).</p> <p><i>Source: SHRP 2 L35 Projects A and B - Value of Travel Time Reliability in Transportation Decision Making</i></p>
	<b>Freight/Truck</b> (per vehicle hour of non-recurring delay)	\$33.69	No major external forces \$51.31 CG \$72.10 RT \$48.77 BF \$70.78	Major Update	<p>This value represents the value placed by carriers and shippers on unreliable travel times, due to increased costs from driver compensation, handling costs at origin and destination, inventory management, depreciation of commodity value. The Reliability Ratio was found to be in the range of 1.5. This is multiplied by the Value of Time calculated above (\$34.21).</p> <p><i>Source: Examining the Value of Travel Time Reliability for Freight Transportation to Support Freight Planning and Decision-Making”, FDOT 2016</i></p>

Category	Benefit	PBA 2040 Valuation (2017\$)	Horizon & PBA 2050 Valuation (2019\$)	Type of Update	What Does The Valuation Include?
Transit Crowding	Decrease in Crowding Penalty Hours	n/a	(same as accessibility benefits)	New benefit	Represents the disbenefit of persons in crowded transit, expressed as their value of time
Collisions	Fatality Collisions (per fatality)	\$10.8 million	\$10.5 million	Data source version update	<p>The valuation includes the internal costs to a fatality collision victim (and their family) resulting from the loss of life, as well as the external societal costs. It represents:</p> <ul style="list-style-type: none"> <li>• Loss of life for the victims</li> <li>• Medical costs incurred in attempts to revive victims</li> <li>• Loss of enjoyment of family member to other members of the family</li> <li>• Loss of productivity to the family unit (e.g., loss of earnings)</li> <li>• Loss of productivity to society</li> <li>• Loss of societal investment in the victim (e.g., educational costs)</li> </ul> <p>Source: USDOT 2018, SWITRS database</p>
	Injury Collisions (per injury)	\$124,000	\$113,715	Data source version update	<p>The valuation includes the internal costs to an individual (and their family) resulting from the injury, as well as the external societal costs. It represents:</p> <ul style="list-style-type: none"> <li>• Pain and inconvenience for the individuals.</li> <li>• Pain and inconvenience for the other family members</li> <li>• Medical costs for injury treatment</li> <li>• Loss of productivity to the family unit (e.g., loss of earnings)</li> <li>• Loss of productivity to society</li> </ul> <p>Source: USDOT 2018, SWITRS database</p>
	Property Damage Only Collision (per incident)	\$4,590	\$3,499	Data source version update	<p>The valuation includes the internal costs to a property damage collision victim (and their family) resulting from the time required to deal with the collision, as well as the external societal costs from this loss of time. It represents:</p> <ul style="list-style-type: none"> <li>• Inconvenience to the individual and to other members of the family</li> <li>• Loss of productivity to the family unit</li> <li>• Loss of productivity to society</li> </ul> <p>Source: USDOT 2018, SWITRS database</p>
Physical Inactivity	Morbidity and productivity (per active adult)	\$1,341	\$1,421	Inflation only	The current valuation from PBA 2040 represents the savings achieved by influencing an insufficiently active adult to engage in moderate physical activity five or more days per week for at least 30 minutes. It reflects annual Bay Area health care cost savings of

Category	Benefit	PBA 2040 Valuation (2017\$)	Horizon & PBA 2050 Valuation (2019\$)	Type of Update	What Does The Valuation Include?
	Mortality (per life saved)	\$10.8 million	\$10.5 million		\$326 (2006 dollars), as well as productivity savings of \$717 (2006 dollars).  <i>Source: California Center for Public Health Advocacy/Chenoweth &amp; Associates 2006, "The Economic Costs of Overweight, Obesity, and Physical Inactivity Among California Adults"</i>
Greenhouse Gas Emissions (per metric ton)	CO <sub>2</sub> emissions	\$100	2015 \$75 2020 \$84 2025 \$92 2030 \$98 2035 \$105 2040 \$113 2045 \$120 2050 \$128	Value Update	This valuation represents the full global social cost of an incremental unit (metric ton) of CO <sub>2</sub> emission from the time of production to the damage it imposes over the whole of its time in the atmosphere. Valuations are available for different years in the future up to 2050, all calculated with a 2.5% discount rate.  <i>Source: Federal Interagency Working Group on the Social Cost of Carbon, Revised 2016</i>
Other Pollutant Emissions (per metric ton)	Diesel PM <sub>2.5</sub> Direct PM <sub>2.5</sub> NO <sub>x</sub> Acetaldehyde Benzene 1,3-Butadiene Formaldehyde All Other ROG SO <sub>2</sub>	\$665,400 \$658,800 \$6,000 \$5,100 \$15,200 \$42,600 \$5,900 \$4,300 \$22,200	\$669,480 \$693,270 \$7,450 \$4,970 \$15,640 \$44,320 \$5,840 \$4,220 \$23,220	Value Updates	These valuations represent the negative health effects of increased emissions including: <ul style="list-style-type: none"><li>• Loss of productive time (work &amp; school)</li><li>• Direct medical costs from avoiding or responding to adverse health effects (illness or death)</li><li>• Pain, inconvenience, and anxiety that results from adverse effects (illness or death), or efforts to avoid or treat these effects</li><li>• Loss of enjoyment and leisure time</li><li>• Adverse effects on others resulting from their own adverse health effects</li></ul> <i>Source: BAAQMD 2018</i>
Noise (per mile traveled)	Auto Truck	\$0.0013 \$0.0170	\$0.0017 \$0.0170	Inflation only	This valuation represents the property value decreases and societal cost of noise abatement.  <i>Source: FHWA Federal Cost Allocation Report</i>
Auto Ownership	Costs per Vehicle	\$3,920	\$5,218	Change in data source	This valuation represents the annual ownership costs of vehicles, beyond the per mile operating costs. It includes insurance, depreciation (15K miles annually) and financing charges.  <i>Source: AAA, as recommended by USDOT</i>
Natural Land (per acre, per year)	Wetland Forestland Pasture Agricultural land	- - - -	\$37,340 \$5,830 \$5,210 \$1,600	New benefit	Represents the benefits of ecosystem goods (e.g. farm products, fish, minerals, water, wood) and services (e.g. disturbance regulation, climate regulation, habitat, nutrient cycling, pollination, recreation), based on comprehensive database of published, peer-reviewed primary valuation studies.  <i>Source: Nature's Value in Santa Clara and Sonoma Counties, Earth Economics (2014/16)</i>

Note: Some values may appear different from a previous version of this document. This is because the values were updated based on a later version of the source, and/or updated from 2018 dollars to 2019 dollars.

## Attachment C - Costs Estimation Methodology

This attachment describes the methodology that will be used to develop lifecycle cost estimates for projects. All project sponsors (i.e. CTAs, city agencies and transit operators) submitted an initial capital cost and annual steady-state O&M (operations and maintenance) costs for their projects. A high-level cost review was conducted by an independent costing consultant, who applied a uniform methodology for all projects. The review used a unit-cost based methodology for capital costs, wherein the consultant estimated the number of units of various asset classes that would be needed by a project (e.g. miles of track, sqft of pavement), and multiplied this by an average unit cost. Indirect costs of construction and implementation, contractor and agency contingency costs and agency soft costs were all added to the direct costs of construction. For O&M costs, the consultant estimated change in vehicle revenue hours, or number of miles for roadway maintenance, or a similarly appropriate methodology. Projects were flagged when the estimated project costs differed from sponsor-provided costs by over 30%. Of the ~85 projects submitted by sponsors, roughly 25% of projects were flagged for either capital costs or operating costs or both. These costs were resolved with project sponsors by sharing our consultant’s estimates and discussing input assumptions.

Lifecycle costs are derived from the initial capital cost and annual O&M costs, and are split into four categories, as shown in Table C.1. Calculation of asset replacement costs is based on the split of initial capital costs between major asset classes, as estimated during the cost review, and the useful life of those major asset classes, shown in Table C.2.

**Table C.1 - Methodology for Estimating Project Costs**

Costs	Includes	Methodology
<b>Upfront Capital Costs</b>	Planning, design, environmental, right of way and rolling stock acquisition, and construction/installation	Project sponsors will submit cost estimates to MTC. Before conducting the assessment, MTC will review costs for accuracy and inclusiveness.
<b>Operating and Maintenance Cost</b>	Ongoing costs of operations and maintenance (O&M)	<p>Project sponsors will submit O&amp;M estimates to MTC. MTC will review these estimates for accuracy and inclusiveness. MTC might also add O&amp;M costs to roadway or transit projects that do not submit O&amp;M costs.</p> <p>As mentioned earlier, according to best practices in cost-benefit analyses, project revenues such as tolls or fares only represent economic transfers and hence they will not be netted out of the costs. The impact of this change is discussed at the end of this attachment.</p>
<b>Asset Replacement Costs</b>	Rehabilitation and replacement cost of assets above and beyond regular O&M costs	<p>Costs of asset replacement are calculated based on the useful lifetime of assets. For example, bus assets have lifetimes of 14 years, and hence we assume there would be a same level of initial capital investment at the 14 year mark.</p> <p>The upfront capital investment costs will be split into major asset classes as shown in Table C.1. The purpose is to distinguish between the major asset classes that have different lifetimes. This split was derived from the high-level cost review of all projects.</p>

Costs	Includes	Methodology
<b>Residual Value</b>	Value of assets in horizon year	Since the analysis year ends in 2080, any remaining value of assets is essentially a negative cost. This is calculated based on straight-line depreciation of major asset components based on lifetime of assets. Real estate assets do not depreciate.

**Table C.2: Useful Lives for Major Asset Classes**  
(Source: MTC data on Bay Area Assets Useful Life Benchmarks, FTA Standard Cost Categories)

Category	Asset Class	Expected Useful Life (in years)	
<b>Vehicle</b>	Local / BRT Bus	14	
	Express Bus	14	
	Light Rail Vehicle	25	
	Diesel Multiple Unit (DMU) Rail Vehicle	25	
	Heavy Rail Vehicle	40	
	Ferry	25	
<b>Transit Infrastructure</b>	BRT ROW Assets	20	
	Guideway (at-grade, aerial)	80	
	Guideway (underground)	125	
	Trackwork	30	
	Stations (at-grade, aerial)	70	
	Stations (underground)	125	
	Train Systems Technology	30	
	Maintenance Facility / Parking Facility	70	
<b>Technology / Operations</b>	Tolling Equipment ITS Other Technology Assets	20	
	<b>Roadway</b>	Pavement (highway, bicycle lanes)	No limit; preventive/restorative maintenance, as % of upfront capital cost (real values): 5 <sup>th</sup> year: 10% 10 <sup>th</sup> year: 20% 20 <sup>th</sup> year: 30% Costs repeat every 5 <sup>th</sup> , 10 <sup>th</sup> and 20 <sup>th</sup> year.
		Structures (bridges, tunnels, elevated ramps)	No limit; preventive/restorative maintenance, as % of upfront capital cost (real values): 5 <sup>th</sup> year: 20% 15 <sup>th</sup> year: 20% 35 <sup>th</sup> year: 30% Costs repeat every 5 <sup>th</sup> , 15 <sup>th</sup> and 35 <sup>th</sup> year.
<b>Real Estate</b>	Land Acquisition	Land Acquisition costs were not considered in project cost calculation since they represent a transfer (see below)	

## Impact of Eliminating Transfers from Project Costs

Monetary exchanges that are transfer payments, that is, transactions where money moves around without anything of economic value being created or consumed, should neither be included as benefits or costs in a social benefit-cost assessment. Examples of such transactions are tolls, parking fees and transit fares. These charges are financial tools used to transfer some or all of a project's cost to its direct beneficiaries and away from society as a whole. While they may be useful for identifying winners and losers, they do not correspond to net impacts on society as a whole.

In the PBA 2040 Project Performance Benefit-Cost methodology, transfers did not appear in the project benefits numerator of the benefit-cost ratio calculation. Specifically, changes in accessibility benefits (logsums) included the travel costs experienced by users in making travel decisions (i.e. tolls, fares etc.), but these charges were added back in as a benefit, thus cancelling each other out. However, the project costs denominator represented net operating costs to the project sponsor. In the case of transit projects, the net operating cost was calculated using the average farebox recovery ratio by operator. In the case of tolling and cordon pricing projects, the O&M costs (and in some cases a portion of the capital costs) were assumed to be covered by expected revenues. In Horizon, to be consistent with social benefit-cost analysis practices, transfers will be removed from the costs denominator as well. This means that the cost denominator would represent the full cost of the project to society.

Benefit-cost assessments (BCA) seek to calculate the societal benefits of transportation, and not benefits to any particular section of the population. When projects involve large transfer payments, such as cordon pricing projects, or other projects that may be studied in Horizon, such as free transit, the BCA is limited in its ability to measure the effects of the project. The magnitude of transfer payments is irrelevant in a BCA, but it is certainly not irrelevant to the economic impacts of the project/policy. Staff will consider the revenue generation and impacts of such projects in the investment strategy.

## Attachment D - Benefit-Cost Ratio Calculation Methodology

The methodology to calculate the benefit-cost ratio (BCR) in Horizon reflects a significant update from the last plan cycle. In Horizon, BCR will be calculated as the ratio of the present value of the stream of benefits of the project, to the present value (PV) of the stream of lifecycle costs, including capital costs, O&M costs, asset replacement/rehabilitation costs, and a reduction in costs based on residual value. The following formula illustrates this calculation:

$$BCR = \frac{PV(Benefits)}{PV(Capital Costs) + PV(O\&M Costs) + PV(Asset Replacement Costs) - PV(Residual Value)}$$

In this methodology, various assertions and assumptions are made with respect to discounting, the period of analysis, and forecasting cost and benefit streams until the end of the analysis period.

### Discount Rate

The real discount rate (discount rate net of the inflation rate) used to calculate the present values of forecasted benefits and costs is 3% per year, based on a review of guidance for benefit-cost analysis applications.

### Analysis Period

Since the assessment is primarily concerned in comparing the BCR of projects, similar timelines should be considered to appropriately compare the present values. BCRs will be calculated for a 55-year period for all projects, including construction time, discounting all benefits and costs to the first year of construction of the project. This analysis period should account for 40-45 years of operation post construction at a minimum, if not more. For convenience of analysis and to compare all projects uniformly, and since the horizon year is fixed at 2050 (i.e. modelled year), the analysis period starts at the same year for all projects, irrespective of when they may be expected to come online. This start year chosen for the analysis is 2025, given that project sponsors indicated potential start data of most projects across the entire decade from 2021-2030. The end year of the analysis is 2080, ten years past the horizon year. A residual value of the investment is added as a negative cost in 2080, to reflect the fact that assets with long lifespans would have remaining value beyond the analysis period.

### Cost Streams

Methodology for calculating asset replacement costs over the analysis period and residual value is described in Table C.1 in Attachment C. These costs would be based on the lifetime of assets and simplifying assumptions will be made to estimate these costs relative to the initial capital cost, based on the asset class.

### Benefit Streams

The general practice followed in benefit-cost analyses of transportation infrastructure is to assume that benefits are constant or consistently rising with metrics such as ridership over the lifetime of the asset, depending on the type of benefit. However, such assumptions may not hold strong in the case of divergent futures. The benefit streams will hence be forecasted using results of no-project baseline model runs. These model runs include existing and committed projects. TM1.5 and UrbanSim models will be run iteratively for a no-project scenario starting in 2015 at the least for

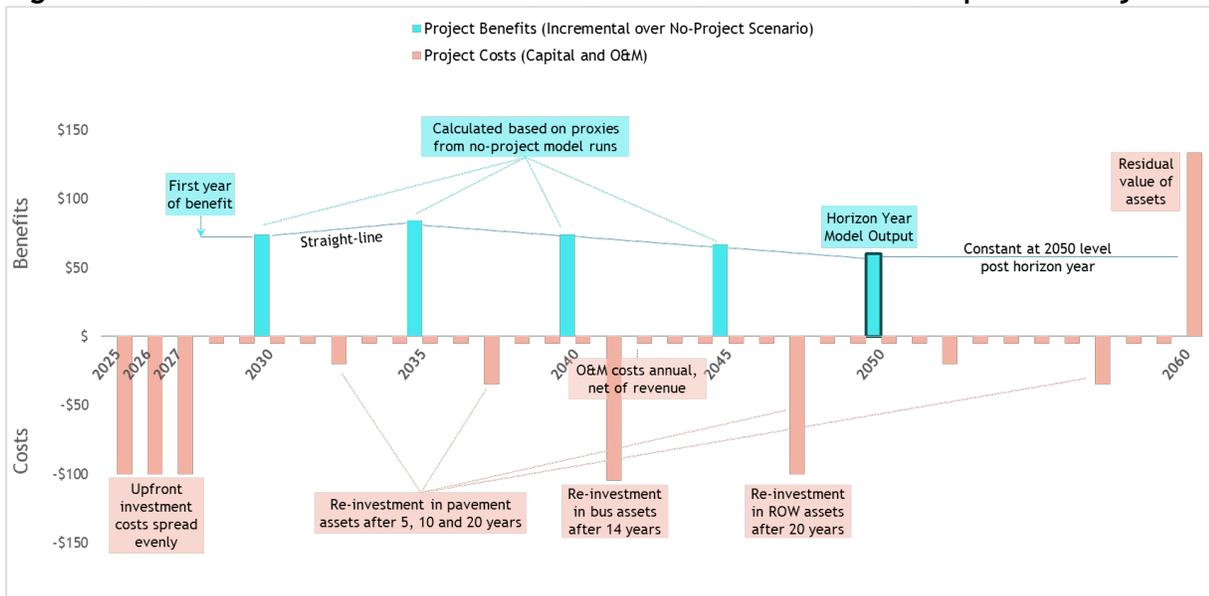
every ten-year interval, but if possible at five-year intervals, until the horizon year 2050. This will provide us metrics such as auto hours, transit hours, walk/bike hours, air pollutant metric tons and VMT (to estimate number of collisions and noise). The trajectory of these metrics will be used as proxies to estimate the stream of project benefits over time. While it would be ideal to run the models iteratively for every individual project as well, the compute time requirements would be prohibitive barring a drastic reduction in run times of the models. REMI outputs have already been generated for every five-year interval until the horizon year. Benefits from 2051 until the end of the analysis period at 2080 will be assumed constant at the 2050 level.

For instance, in a future where there are no major external shifts, benefits from lowered emissions due to a major transit investment could be assumed to grow in a straight line over 20 years to the Horizon year value, if maximum ridership is assumed to be reached in the 20<sup>th</sup> year. However, if the electric vehicles are a high percentage of the fleet mix in a given future, then benefits from emissions may rise for the first ten years when the fleet is largely fossil-fuel powered, but eventually drop to a much lower value, as the horizon year benefits would be represented in the output of the Travel Model 1.5. Capturing the benefit that the transit investment provides in the interim period is critical to evaluate the benefit-cost ratio. The assumption for the stream of these benefits from reduced emissions may be tied to the penetration of electric vehicles into the fleet and other related factors.

All the above assumptions are illustrated in Figure D.1. The example used is a new bus rapid transit (BRT) project, with upfront capital costs of \$300M, with a construction timeline of 3 years. The costs are split by major asset class as defined in Table C.2, \$100M in buses, \$150M in pavement, and \$50 in stations.

Despite more complicated calculations, this approach represents a stronger approach than that used in PBA 2040, and it enhances the rigor of the benefit-cost assessment. For illustrative purposes, rough BCRs were calculated for two projects from PBA 2040 using the streamed benefits and costs approach with present values. The BCRs from both approaches are compared against each other for both projects, shown in Table D.2. Project 2 scored higher than Project 1 during the last plan cycle. However, when Project 2's longer construction time and Project 1's higher magnitude of annual benefit are taken into account by the Horizon BCR approach, Project 1 scores higher.

**Figure D.1: Illustration of Benefit and Cost Stream Calculations for Sample BRT Project**



**Table D.2: Comparison of BCR Calculation Methods for Two Sample Projects**

BCR Calculation Line Item	Project 1 (higher magnitude of annual benefit)	Project 2 (longer implementation time)
Upfront Capital Costs (\$m)	\$820	\$737
Annual O&M Cost (\$m)	\$62	\$0
Annual Benefit (as estimated in Travel Model One) (\$m)	\$248	\$95

**BC Ratio calculation with annualized benefits and costs, as in PBA 2040**

Annualized Cost (= annualized construction cost + annual O&M cost) (\$m)	\$121	\$37
<b>BC Ratio (as calculated in PBA 2040)</b>	<b>2.1</b>	<b>2.6</b>

**BC Ratio calculation with Horizon lifecycle benefit/cost methodology using Present Values (PVs)**

Construction Start Year Assumption	2021	2021
Construction / Implementation Duration	1 year	5 years
Useful Life Of Asset	14 years	20 years
Asset Replacement Cost (\$m)	\$820 in year 15	Assumed 0
<b>BC Ratio (as calculated using PVs)</b>	<b>2.4</b>	<b>1.3</b>

## Attachment E - Supplemental Assessments to Benefit-Cost Assessment

Supplemental assessments evaluate limitations of the project performance results, to document the known shortcomings of the approach and better inform policy makers of the strengths and weaknesses of the analysis outcomes. Two assessments can be conducted in this regard: the Confidence Assessment, and Sensitivity Testing.

### Confidence Assessment

The Confidence Assessment would address two main limitations of the Benefit-Cost Assessment:

1. Travel Model Accuracy
  - a. Does the travel model have limitations in understanding a particular type of travel behavior (e.g. shared TNCs)?
  - b. Does the travel model lack an understanding of smaller-scale project travel changes relative to the region (e.g. single infill station, expressway improvements)?
2. Framework Completeness
  - a. Does the travel model output capture all of the primary benefits of the project (e.g. transit reliability, or recreational or tourism benefits)?

Various limitations that continue to persist despite model improvements would be highlighted through this assessment. For instance, Travel Model 1.5 does not have the ability to forecast weekend travel or transit reliability. The model also has limitations in considering some modes of travel separately, such as shared TNCs, or bicycling to transit. External forces in the futures such as penetration of automated technologies are represented by sweeping assumptions and hence travel model accuracy may be compromised.

### Sensitivity Assessment

Sensitivity assessment can evaluate how the Benefit-Cost Assessment outcomes change as a result of modifying some key assumptions. In contrast to the Confidence Assessment, this is a quantitative evaluation.

Given that Horizon assesses project performance in three different futures, this in itself reflects a level of sensitivity analysis with respect to various assumptions such as income distributions, valuations of time (which is used to interpret accessibility benefits), penetration of autonomous and electric vehicles, cost of driving, and other external forces that define the futures. However, further sensitivity tests may be conducted on an as-needed basis based on the feedback to be received in Fall 2019 on the findings of the assessments.

Sensitivity tests of the benefit-cost assessment may include:

1. Increasing capital cost estimates
2. Extending the duration of the construction timeline
3. Increasing the discount rate for all benefits except natural resources to 7%
4. Lowering the discount rate for natural resources to 0%
5. Increasing the safety benefits of AVs (i.e. percent decrease in collisions) to 90%, 40%, and 10% in the horizon year for Clean and Green, Back to the Future, and Rising Tides Falling Fortunes, respectively

## Attachment F - Guiding Principles Assessment

The Guiding Principles reflect the core aspirations for the Bay Area through 2050 - to create a region that is **Affordable, Connected, Diverse, Healthy, and Vibrant**. The Principles are intended to inform each of the key elements of *Horizon*, including analysis of projects in the Project Performance Assessment, the prioritization of policies in the Perspective Papers, and the selection of metrics & strategies for each future evaluated through the process.

Within the Project Performance Assessment, the Guiding Principles Assessment will be integrated as a secondary, qualitative assessment alongside the benefit-cost assessment. Unlike past long-range planning cycles, the assessment will be used solely to bring to attention when project impacts may not be supportive one or more of the Principles. As such, the criteria for the Guiding Principles Assessment are narrowly defined to focus on significant negative impacts associated with the project itself, rather than the performance of the jurisdiction(s) where the project may be located. The intent of the assessment is to bring to attention potentially significant adverse impacts that projects may have. **Table E.1** below shows the criteria for each of the Guiding Principles.

**Table F.1: Framework for Guiding Principles Assessment**

Guiding Principle	Evaluation Question <i>If yes, the project is not supportive of the Guiding Principle</i>	Application of Evaluation Question <i>For a project to be flagged as not supportive of the Guiding Principle...</i>
Affordable	Does the project increase travel costs for lower-income residents?	<ul style="list-style-type: none"> <li>The project would have to actively eliminate a lower-cost travel alternative, rather than just offering a new travel option.</li> </ul>
Connected	Does the project increase travel times or eliminate travel options?	<ul style="list-style-type: none"> <li>The project would have to increase travel time for one mode without decreasing it for another mode; exceptions would be made for projects with significant safety benefits that justify increased travel times, or...</li> <li>... the project would have to eliminate a modal option from a travel corridor.</li> </ul>
Diverse	Does the project displace lower-income residents or divide communities?	<ul style="list-style-type: none"> <li>The project would have to directly displace lower-income households* through site acquisition, or...</li> <li>The project would have to build an elevated freeway structure through an existing neighborhood.</li> </ul>
Healthy	Does the project significantly increase emissions or collisions?	<ul style="list-style-type: none"> <li>The project would have to yield a significant long-term net increase in emissions and/or collisions.</li> </ul>
Vibrant	Does the project eliminate jobs?	<ul style="list-style-type: none"> <li>The project would have to directly result in a net reduction of jobs*.</li> </ul>

\* Threshold of ~100 homes impacted or ~100 jobs displaced.

The assessment will check each project for alignment with each principle with respect to no-project conditions. Each project would be flagged as either supporting a principle or not supporting a principle. The decision on how these flags would be used in the overall Project Performance Assessment will ultimately be set by the MTC Planning Committee.

## Attachment G - Equity Assessment

The equity assessment will consist of two components to evaluate project-level impacts. The first component is a geographic assessment, following the same methodology in PBA 2040. The second component is a quantitative assessment that examines distributive impacts of accessibility benefits across income groups, using Travel Model outputs. This methodology is still being evaluated for feasibility.

### Geographic Assessment

This assessment measures whether projects would serve a Community of Concern (CoC). Using GIS, the assessment will check whether a project provide a point of access directly to one or more CoCs, and provide a Yes/No scoring. Revised definitions of CoCs that were adopted in early 2018 will be used for this analysis, updated with the latest available demographic data.

### Accessibility Benefits across Income Groups

This methodology seeks to examine the distributive impacts of accessibility benefits across income groups using Travel Model outputs, and lends insight into which income groups benefit most from the project's quantified accessibility benefits.

Travel Model 1.5 outputs of changes in accessibility benefits can be split by income group at the TAZ subzone levels<sup>1</sup>. The income groups were originally defined as approximate quartiles, but remained defined by income levels adjusted to 1999 dollars to be consistent with the requirements of the transportation model. The income categories, in 1999 dollars, are less than \$30,000; from \$30,000 to \$59,999; from \$60,000 to \$99,999; and \$100,000 and above. In 2019 dollars, the breakpoints between the categories are approximately \$45,000, \$90,000 and \$150,000.

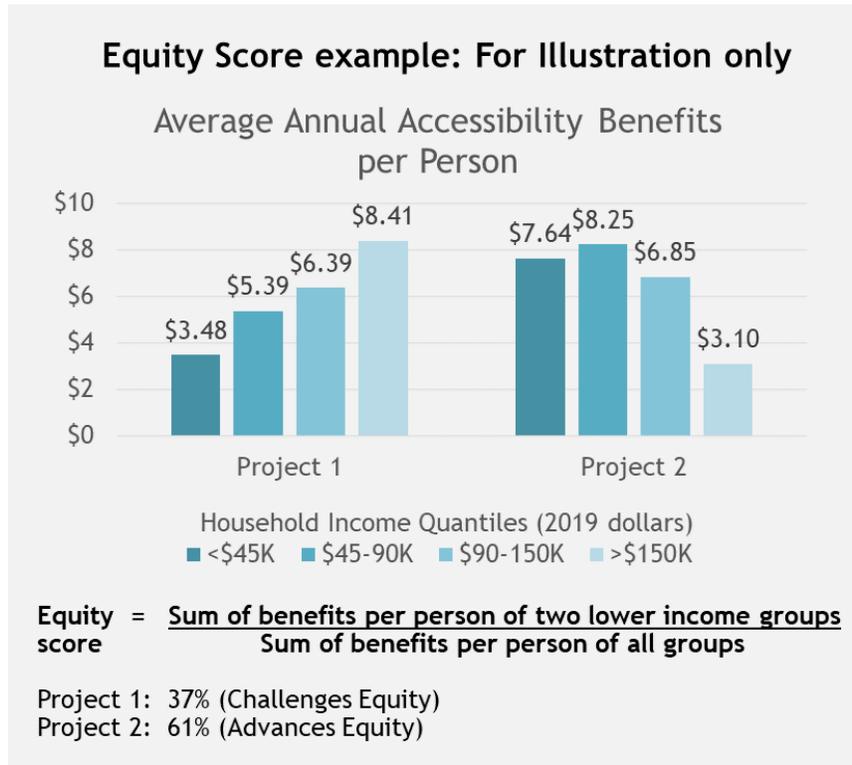
Average annual accessibility benefits per person can be calculated based on the model outputs and monetized using the same valuations that are used to calculate the benefit-cost ratio. An equity score can then be calculated as the ratio of benefits per person of the two lower income groups to the sum of benefits per person of all income groups, thus lending insight into which income groups benefit most from a project in terms of accessibility. This is illustrated in Figure G.1. A higher equity score means that a project provides more accessibility benefits to persons of the two lower income groups.

There are three scores a project can get: Advances Equity, when the score is over 60%; Even Distribution of Benefits, when the score is between 40-60%; and Challenges Equity, when the score is less than 40%.

This methodology can be further extended by assigning weights to accessibility benefits of different income groups, based on the principle of diminishing marginal utility of accessibility gains, in order to calculate a weighted benefit-cost ratio. However, a sufficient methodology has not yet been found.

Accessibility benefits can also be split into population subgroups based on the number of vehicles in the household, and this could be explored in the future to determine distributive impacts of projects on the basis of vehicle ownership. Given the current setup of the model, accessibility benefits cannot be split on the basis of age, race, gender or disabilities.

**Figure G.1: Illustration of Equity Score Calculation for Two Sample Projects**



1. TAZ refers to Transportation Analysis Zone; there are 1,454 TAZs in the Bay Area. TAZs are divided into subzones, which include ‘cannot walk to transit’, ‘short walk to transit’, and ‘long walk to transit’

## Attachment H - Responses to Feedback Received post August RAWG

### Benefits Estimation Methodology

Feedback	MTC Response
<p><b>Accessibility</b></p> <p>How are accessibility benefits weighted by geography, as the use of household residence location-based weighing is biased against improvements in high job-density parts of the region where a greater proportion of travel is not household residence location based?</p>	<p>Benefits from both household and non-household based trips accrue at the household level. However, we will not be attributing benefits to any particular geography given this is a regional assessment. Benefits of a project will represent the benefits delivered to the entire region.</p>
<p>Consider measures of accessibility such as number of jobs or point-of-interest within X minutes of travel time by transit/driving.</p>	<p>This measure is implicitly taken into account in the calculation of the accessibility logsums, which represents utility. The closer destinations are to an individual or household (among various other factors such as cost, congestion etc.), the higher the utility. The destinations that the individual/household “chooses” is based on surveyed travel patterns, including “mandatory” trips (work/school) and “non-mandatory” trips (other points of interest such as park, grocery, etc.).</p>
<p>Consider valuing recurring delay given this is substantial.</p>	<p>Recurring delay is estimated by the Travel Model and is one of the main inputs taken into account within the accessibility benefits. The travel time component of the accessibility logsums takes into account the free-flow time and recurring delay.</p>
<p>Transit crowding may be a disbenefit for its users, but is it a benefit for the overall transportation network.</p>	<p>The accessibility benefits due to a project are the aggregate of benefits experienced by individuals in their use of the transportation network. The methodology thus captures benefits and disbenefits as experienced by all people within the network simultaneously. In this example of transit crowding, while some users may experience an accessibility loss (disbenefits) since their transit travel is crowded, other users may experience an accessibility gain (benefit) since there may be fewer auto trips and faster travel times.</p>
<p><b>Reliability</b></p> <p>“Inclusion of roadway reliability improvements but not transit reliability improvements may provide roadway projects benefit opportunities unavailable to transit projects.” Was consideration given to quantifying transit travel time reliability benefits? Will there be a way of capturing travel time reliability improvements as a benefit in project scoring elsewhere?</p>	<p>Travel Model 1.5 will capture both transit delay and transit crowding - a top priority for improvement during the development cycle for the new model. However, due to limited resources, the model cannot currently estimate a distribution of transit travel time. We recognize that improving transit reliability is also an important topic. Capturing explicit benefits of transit reliability may potentially be a topic of research for the next iteration of the Travel Model. In this assessment, potential benefits to transit travel time reliability due to a project can be captured qualitatively in the confidence assessment.</p>
<p><b>Emissions</b></p> <p>Use domestic valuation for emissions since global valuation is no longer acknowledged by federal government.</p>	<p>Comment noted. However, the valuation proposed is consistent with other agencies in the state of California.</p>
<p>Capture environmental effects of power plants that generate electricity for electric vehicles -</p>	<p>Environmental effects of power plants (i.e. upstream emissions) are applicable not only to electric vehicles, but also to conventional vehicles and transit. To</p>

Feedback	MTC Response
<p><b>current methodology gives no disbenefit to electric vehicles over biking/walking,</b></p>	<p>consider this “wells-to-wheels” effect, we would have to make various assertions and assumptions, such as the projected change in the Bay Area’s energy sources in the future, time of day that people charge their vehicles, improvements in battery technology to store energy, etc. Given resource constraints, and based on the recommendation of our state partners that such effects are taken into account by other partner agencies, we are choosing to focus on tailpipe emissions. We do recognize that the current methodology gives no disbenefit to EVs over biking/walking in terms of emissions, but there is disbenefit given to the congestion that EVs contribute to, as well as to vehicle ownership costs and operating costs per mile (which include the cost of electricity).</p>
<p><b>Are valuations of emissions for horizon year only? In PBA 2040, didn’t some valuations vary by year?</b></p>	<p>PBA 2040 calculated costs only for the horizon year, and so there was no need to consider valuations by year. However, in Horizon, valuations can be considered for multiple years, as this is available from the source. Please refer to the updated Table B.1.</p>
<b>Safety</b>	
<p><b>Is MTC providing guidance on what specific types of operational improvements may provide safety benefits?</b></p>	<p>The list of Crash Reduction Factors (CRFs) that will be used are listed in Table A.2. Given feedback during RAWG that projects may not have design detail, we will consider only few specific safety improvements and associated CRFs that align with the typical profile of projects that have been submitted.</p>
<p><b>Clarify calculation of change in number of collisions.</b></p>	<p>Please refer to updates in Table A.1, including the endnotes.</p>
<p><b>Explain how to interpret Crash Reduction Factors (CRFs).</b></p>	<p>Please refer to updates in Table A.1, including the endnotes.</p>
<p><b>Are only roadway operational improvements considered, as use of VMT as method for estimating collisions is only applicable to roadway? Also, is such VMT estimate link-specific / local, or based on some buffer of proximate links?</b></p>	<p>Based on the updates in the methodology, change in collisions arising specifically from safety improvements are not calculated using VMT. Please refer to Table A.2 for the specific improvements considered. Collisions are not limited to auto collisions; most transit and ped/bike collisions are accounted for as well, since they are part of the collision data in the TIMS database.</p> <p>Please note that the methodology to estimate change in collisions as a result of change in VMT continues to be used, as in PBA 2040. The VMT-based estimate of collisions is not link-specific. It is based on area type (urban/rural), facility type, and the number of lanes.</p>
<p><b>Inclusion of safety benefits and use of Crash Reduction Factors (CRFs) may provide roadway projects benefit opportunities unavailable to transit, pedestrian and bicycle projects.</b></p>	<p>CRFs are included for transit/ped/bike improvements; please refer to Table A.2. As mentioned above, CRFs of roadway projects will be applied to the collisions at that location, whether they are auto, transit, ped or bike.</p>
<p><b>Negative Crash Reduction Factor (CRF) (i.e. increase in crashes) for lane expansion is only for 4 to 5 lane expansion - do other similar lane expansions *not* cause negative CRF?</b></p>	<p>Please refer to the updates in Table A.2. The prior table simply showed some example CRFs, rather than the all-inclusive list.</p>

Feedback	MTC Response	
<p>Are projects that increase VMT (w/o any explicit safety countermeasures) decreasing safety and by extension increasing costs?</p>	<p>Since our method to calculate change in number of collisions is based on VMT, and the change is positively correlated with increase in VMT, any project that increases VMT will 'increase' the number of collisions, which is a disbenefit to the project (not cost). This is the same methodology as in PBA 2040.</p>	
<p>Having "Safety" address only road and highway projects, without considering transit systems, overlooks a major statutory initiative of the Federal Transit Administration. Why?</p>	<p>As mentioned in the updated methodology, in Table A.1, both methods (i.e. VMT-based method and CRF method) take into account transit, pedestrian and bicycle collisions. SWITRS data as reported in TIMS indicates if the collision involved a transit vehicle or ped/bike. (<a href="https://tims.berkeley.edu/">https://tims.berkeley.edu/</a>)</p>	
<p>Physical Activity</p>	<p>Physical Activity - Please provide methodology?</p>	<p>Please refer to updated document for the methodology used to capture benefits from increased physical activity, in Table A.1. Note that an R-based ITHIM tool is in development by Neil Maizlish at UC Davis. This is expected to be ready in time for Project Performance runs, and will be tested for feasibility. UPDATE: due to staff time constraints, this new methodology could not be tested/implemented.</p>
<p>Noise</p>	<p>Are noise benefits / disbenefits allocated by proximity (i.e. exposure)? How does this relate to equity analysis?</p>	<p>While no changes have been made since the last project performance assessment, we have made a simplifying assumption. Detailed modelling would require resources we do not have. We do however conduct noise impact modelling in the EIR.</p>
	<p>Why do [noise] auto costs increase due to inflation, but truck costs do not?</p>	<p>Both auto and truck noise costs have been adjusted for inflation. This is not apparent in the numbers shown due to rounding.</p>
<p>Natural Land Value</p>	<p>Clarify position on natural lands from an accounting perspective - since conversion of land can lead to tax revenue / higher productivity and output.</p>	<p>Economic impacts are not considered within the benefit-cost assessment for two reasons. First, the causal relationship between travel time savings (from a project) and economic development is difficult to quantify and MTC does not currently have a method for developing this estimate at the project-level, especially given the wide variety of projects being evaluated. Second, economic impacts are examples of "follow-on" benefits that indirectly follow cost and time savings from the project. Adding the economic benefits to the benefit-cost assessment might lead to double-counting of the direct travel time and cost benefits. On the other hand, the disbenefit from the conversion of natural lands that is being considered in this assessment represents a loss of social benefit that the land currently offers, expressed as a monetary value.</p>
	<p>We also encourage MTC to consider additional ways the Greenprint tool could be used in the PPA process, such as an assessment tool for hazards and a method to investigate the impacts of a proposed transportation project on existing urban greening amenities or urban greening needs.</p>	<p>Comment noted. The disbenefit from replacing natural lands with transportation projects would primarily apply to projects in non-urbanized areas, but also those that may take over natural land that is located in undeveloped locations within the urban footprint, as per the suggested land categories. Transportation projects will not be assessed relative to other potential uses of land that do not already exist.</p>
<p>Other</p>	<p>What about land developed into housing / other uses due to</p>	<p>We are limited by model run times and cannot evaluate land use impact at a project level. Land use</p>

Feedback	MTC Response
<p>transportation expansion (induced demand)? We also encourage MTC to consider how the transportation projects under review may induce particular development patterns and include an estimation of the effects of this induced development in the Benefit/Cost analysis.</p>	<p>impacts will certainly be modeled through the futures to understand induced development patterns.</p>
<p>Hedonic pricing of homes - Post processing forecast on hedonic pricing of homes from policies being considered in the travel demand model.</p>	<p>This is done through the interaction of the land use model (UrbanSim) and travel model through the futures - accessibility outputs from the travel model are inputs into the land use model. However, compute time requirements prohibit such feedback between the models at the project level.</p>
<p>Table A.1 - separate benefits from disbenefits or add another column to indicate how each factor correlates with project benefits.</p>	<p>A new column "Accrual" has been added to Table A.1 to clarify this.</p>
<p>Are there any means to account for weekend travel since the proposed analysis would certainly undermine the benefits of projects that have extensive use outside peak work week travel?</p>	<p>The modelling is for a typical weekday (in the horizon year 2050) for five time periods - early morning, AM peak, midday, PM peak, late evening. There is no means to account for weekend travel within the current model framework. If a project caters specifically to addressing weekend congestions, this will be highlighted within the confidence assessment. There will also be other avenues later on the process to raise this, by submitting a compelling case, as we have done in the past. [UPDATE: we will no longer be using the compelling case approach, but will certainly engage with sponsors to discuss a path forward]</p>
<p>Consider shovel-ready projects vs. visionary projects and also projects that complement and/or complete other projects such as "gap closure projects"</p>	<p>All projects will need to be evaluated consistent with other projects. Existing projects AND committed projects are part of the baseline network; so if the project being evaluated is complimentary, the effect would be captured.</p>

**AV/EV Assumptions**

Feedback	MTC Response
<p>Assumptions about electric vehicle fleet penetration and the potential effects are largely speculative and may result in modal biases when calculating benefits. What is the basis for assumptions about EV penetration in the fleet mix?</p>	<p>The assumptions for EV penetration in the horizon year were defined by experts when the three diverging futures were ascertained. This process involved peer exchange, gathering feedback from partners, and developing what-if scenarios.</p> <p>As an overall note, Horizon attempts to stretch assumptions to stress-test the benefits of projects and some of these assumptions may be considered speculative. The Preferred Scenario for PBA 2050 will be based on assumptions in the state's EMFAC emissions model, as in the past cycle.</p>
<p>What is the relationship between EV penetration and AV penetration?</p>	<p>There is no specific relationship defined. EV penetration, as shown as a percentage of fleet in the endnotes of Attachment A, will be applied to both AVs and conventional vehicles uniformly.</p>

Feedback	MTC Response
Will EV penetration assumptions be varied for all project evaluations?	Yes - all projects will be evaluated with same assumptions. Please refer to the updated document for more information on trajectories towards the penetration rate in the interim years and other questions.'
Does EV fleet penetration affect noise?	We will not be investigating this effect at this point due to limited resources.
What is the basis assumptions about AV penetration in fleet mix? Is fleet mix or "trip mix" the right measure (i.e. will AVs be individually owned or part of managed fleets)? Will a variety of AV assumptions be made within each one of the larger Futures scenarios?	Assumptions on penetration of AVs for each future have been added to the endnotes of Table A.2. The percentages refer to fleet mix, as decided during the process of developing the assumptions for the futures.
Assumptions about the potential safety benefits of automated vehicles are largely speculative and may result in modal biases when calculating benefits. What empirical evidence is used to justify assumption that AVs will provide safety benefits?	Safety benefits of AVs will be considered in the 'Clean and Green' and 'Back to the Future' futures, where the AV fleet penetration is 95% and 75% by the horizon year, respectively. We intend to use assumptions from the Future Mobility Research Program work, including a Delphi survey conducted with subject area experts (e.g., 40% to 90% reduction in collisions in fully-automated future based on survey results). The trend towards this reduction in collisions would not be assumed to be linear; we are cognizant of research on the potential disbenefits of mixing of human/AV fleets. We recognize the speculative nature of these assumptions, and we intend to highlight this in the methodology and the Confidence Assessment. Please find specific assumptions on percentage decrease in collisions in the updated document.
Assumptions about electric vehicle fleet penetration and the potential effects are largely speculative and may result in modal biases when calculating benefits. What is the basis for assumptions about EV penetration in the fleet mix?	The assumptions for EV penetration in the horizon year were defined by experts when the three diverging futures were ascertained. This process involved peer exchange, gathering feedback from partners, and developing what-if scenarios.

## Benefit Valuations

Feedback	MTC Response
Are the current TM2 implied regional wage rates consistent with current median regional wage rate (\$25.43)?	The input data into Travel Model 1.5 on persons is derived from PUMS data and is described here: <a href="https://github.com/BayAreaMetro/modeling-website/wiki/PopSynPerson">https://github.com/BayAreaMetro/modeling-website/wiki/PopSynPerson</a> . Income is available only as an annual gross personal income (which may include sources apart from wage). For all persons employed full-time, the median figure is \$54,390 (in 2018\$). The median regional wage rate used for valuation, \$25.43, times 2,000 working hours in a year is \$50,860.
Why are auto operating costs lower in Horizon than in PBA 2040? If \$0.20 is assumption based on efficiencies in 2050, are higher values used in interim years, before these efficiencies are achieved?	Auto operating costs of \$0.20 is based on fuel and maintenance/repair costs. This is not used explicitly for calculating benefits; it is an input into the Travel Model logsum calculations. The value of \$0.30 stated previously included depreciation costs, but regardless, it was never used for any purpose, since the input to TM1 did not include depreciation either.
Do transit O&M costs also reflect these types of efficiency gains?	Aside from the fact that the auto operating costs do not represent efficiency gains, if sponsors believe that O&M costs have efficiency gains, this should be part of the factsheets. We do not assume any

Feedback	MTC Response
	change in the cost to traveler as a result of changes in transit O&M. Fares stay consistent with today's fares in real terms.
Do auto operating cost assumptions vary by year (for interim year forecasts required for calculating present value) ?	Auto operating cost inputs do vary in interim years. The last column in Table B.1 has been updated to reflect this.
What does “no major external forces \$31.18” under auto operating cost mean?	This was a typo and has been corrected.
Auto ownership valuation seems to lower than other published data - could source link be provided?	The valuation represents average ownership costs across all vehicle types, as found in: <a href="https://newsroom.aaa.com/tag/driving-cost-per-mile/">https://newsroom.aaa.com/tag/driving-cost-per-mile/</a> . The valuation will be aligned with that used in the Travel Model.
Why are the fatality, injury, and property damage valuations lower in Horizon than in PBA 2040?	This is due to updated guidance from USDOT. The valuation in the Horizon methodology reflects the latest USDOT guidance that was released in 2016.
Are there costs associated with re-use of urbanized lands for transportation infrastructure?	The methodology does not count this as a disbenefit.

## Cost Estimation

Feedback	MTC Response
What does “upfront investment cost” mean?	This refers to the initial capital costs of construction/implementation.
Are financing costs considered? If so, what are these assumptions? If not, does timing of project reflect when 100% of funds are available? If new method captures benefits of quick implementation, does the method assume we have all the money required for such an implementation?	Guidance for benefit-cost analyses suggests that costs should be recorded in the year they are expected to be incurred, regardless of when payment is made for those expenses. We expect similar benefit-cost results regardless of whether costs are incurred upfront or over a long-term debt repayment plan. This is because we are proposing to discount present value of costs using a real discount rate.
Note that incorporating the lifecycle costs is a significant change from prior PBA cycles, and will likely result in a significant increase in project costs, especially for projects such as transit vehicles.	Yes, this is the correct, especially since we would like to analyze project benefits uniformly across all projects for the same analysis period. Project benefits would see a similar significant increase.
The memo indicates MTC will net out transit revenue from costs. How will this strategy apply to projects such as a means-based fare program? For projects that will see revenue from tolling, will that also be netted out of the project cost?	This has been revised in the updated methodology. Best practice in B/C ratio calculation suggests that since all tolls/transit fares are transfer payments, they should not be counted as benefits or costs - they should simply not appear in the calculation. The impact of this is discussed in Attachment C.
What is the temporal resolution of the benefits stream? What intervals required to capture the non-linear time effects of different costs and benefits (e.g. EV fleet penetration	The forecast of the benefit streams will be based on the results of Round 1 Futures runs, which include committed projects and projects that were rated as “high performers” from PBA 2040. We plan to iteratively run both Travel Model 1.5 and UrbanSim models starting in 2015 at the least for every 10 year interval, but if possible at 5 year

Feedback	MTC Response
<p>over time, and the impacts on emissions valuations)? At what intervals (for what years) will TM2 be run to calculate the stream of benefits? At what intervals (for what years) will REMI and UrbanSim be run?</p>	<p>intervals. This will provide us metrics to be used as proxies to estimate benefits of projects over time. While it would be ideal to run the models iteratively for every individual project as well, the compute time requirements would be prohibitive barring a drastic reduction in run times of the models. REMI outputs have already been generated for every 5 year interval until the horizon year.</p>
<p>When is information in the stream is updated directly versus interpolated, as these will all influence the present value?</p>	<p>Benefits for projects will only be calculated for horizon year and interpolated using proxies from the futures iterative model runs, as discussed above.</p>
<p>There should be accounting for the value of time in calculating benefits and cost.</p>	<p>The discount rate within the methodology accounts for the time value of money.</p>
<p>What method or tool will be used to determine the residual value of a certain project?</p>	<p>Please refer to Table A.3 in the methodology.</p>
<p>The proposal to look at different capital costs, construction timelines, longer benefit streams and different discount rates, and how these relate to confidence intervals, and relationships to other assumptions (e.g. different land use, different EV/AV penetration rates) is appropriate, but transparency about how each of these assumptions influences individual project evaluations is essential.</p>	<p>Please refer to the Sensitivity Analysis (Attachment D) for the assumptions we would look to test. Adjusted outputs will be provided for outputs such as the B/C ratio, equity score, guiding principles assessment, for each future.</p>

### Benefit-Cost Ratio Calculation

Feedback	MTC Response
<p>Discount rate of 7% is too high relative to those used elsewhere (e.g. 2% is used by FTA).</p>	<p>The 2% rate used by FTA, which represents U.S. Treasury bond rates, is for cost-effectiveness analyses, which is different from benefit-cost analyses that quantify public benefits such as travel time savings or collision reductions. US Office of Budget and Management (OMB) suggests a discount rate of 7% for all B/C analyses that involve benefits to the general public, which represents the real discount rate on private investment. Based on the feedback received, we have revised the discount rate to be used as 3%, which accounts for the variations in guidance for B/C analyses.</p>
<p>We recommend that MTC uses a 0% discount rate for natural lands, rather than the proposed 3.5% annual discount rate, to better align with the scientific consensus regarding the ongoing benefits these lands provide.</p>	<p>The discount rate for natural resources has been lowered to 2.5%, to be consistent with other Bay Area agencies. UPDATE: Given the discount rate for all other benefits was revised to 3% from 4%, the discount rate for natural resources was adjusted to 3% as well to be consistent.</p>
<p>Starting analysis period in 2021 is disadvantageous for megaprojects that may not start until later.</p>	<p>To evaluate all projects along similar timelines, and to keep the analysis consistent and easier since we are evaluating over 90 projects, we will start the analysis period on one single year. We have changed</p>

Feedback	MTC Response
<b>Suggestion to start the analysis period at the potential year of project adoption.</b>	this from 2021 to 2025 based on feedback that the next plan will be released only in 2021, and also that sponsors have indicated the potential start date of most projects across the entire decade from 2021-2030.
<b>Analysis period of 30 years is not sufficient.</b>	Please refer to the updated methodology - analysis period has been extended to 55 years including construction time. Longer analysis periods are generally not considered since there is a limit to the utility of modeling project benefits over very long time periods. This methodology would generally account for 25 years of operation post construction at a minimum, if not more (45 years in the sensitivity analysis).
<b>If lifecycle of project is less than analysis period (considering both project completion date and 2050 horizon date), how is this handled? How does lifespan vary by project, and what is the interaction between project timing (when project comes online and benefits accrue), project life span and calculation of present value? Does method account for when projects come online?</b>	If this comment is referring to the life of a capital investment being less than analysis period, then the methodology calls for a re-investment in the capital asset at the end of its useful life, for replacement. Please refer to the details of the methodology in Attachment C.
<b>Does return on investment figure into the analysis (e.g. one could have a project with a modest BC ratio, but with a huge net return)?</b>	We intend to display the B/C ratio along with the magnitude of incremental benefits and costs as well. When comparing a large number of projects, the B/C ratio best helps identify effective ways to spend constrained financial resources, but the magnitude of the benefit will also be considered. In reviewing the methodology, it is important to recognize that the intent of this assessment is to make broad comparisons with the best information available and identify outliers.
<b>Use annualized cost formula as in FTA's Standard Cost Category worksheets for residual value.</b>	While the methodology to calculate costs is equivalent to this formula in the FTA SCC worksheet, given we are considering both benefit and cost streams over the analysis period, and that benefit streams will have varying trajectories by future, we will not be using this formula.
<b>Some useful life assumptions maybe too short; refer to FTA's guidance.</b>	These will be reviewed with the cost consultant and will be determined in line with federal/state guidance as well. We are also using useful asset life benchmarks that agencies self-report to MTC to cater to conditions in the Bay Area.
<b>Add bike lane to asset classes.</b>	Bike lanes will be classified under pavement.

## Guiding Principles Assessment

Feedback	MTC Response
<b>It is still difficult to imagine what types of projects would be flagged as not supportive of the guiding principle using the evaluation criteria. What types of projects do you anticipate would perform poorly for each?</b>	<p>The purpose of this assessment is to bring to attention when a project has an impact that does not align with the Guiding Principles. The following example project types may have impacts that are not supportive of the guiding principles:</p> <ul style="list-style-type: none"> <li>*Affordable - New train service that eliminates a cheaper bus option;</li> <li>*Connected - Express lane project that increases travel time for general purpose lanes;</li> <li>*Diverse - Building a connected roadway that displaces households, or an elevated transit line through an existing neighborhood;</li> <li>*Healthy - A roadway project that leads to greater auto usage (and</li> </ul>

Feedback	MTC Response
	thereby greater emissions) relative to a no-project scenario; and, *Vibrant - Autonomous shuttle project to replace existing bus routes.
<p><b>Penalizing transit projects with aerial structures to avoid dividing communities could deter transit-oriented development or lead to prohibitive costs (for underground) / projects with land acquisition for new stations in low income neighborhood would be unfairly penalized even if it improved job access.</b></p>	<p>Building elevated structures that divide existing communities or land acquisition that results in displacement of lower-income households does not align with the Diverse principle. If the project improves job access, these effects will be reflected in the accessibility benefits within the Benefit-Cost Assessment. Division of communities or displacement of households however is a critical impact that the Guiding Principles Assessment seeks to bring to attention. All the assessments (i.e. Benefit Cost, Guiding Principles and Equity) will be taken into account together in evaluating the projects.</p>
<p><b>Affordable: How would you evaluate tolling projects such as cordon pricing? Currently driving may be the lowest-cost mode, which would be priced higher under a cordon pricing situation. Would MTC consider a project to still be considered affordable if additional transit service is provided, with upgrades to bicycle and pedestrian access?</b></p>	<p>If the project eliminates a lower-cost travel alternative for low-income residents, it would not align with the Affordable principle, unless the project has provisions to maintain the existing cost. In the case of a cordon pricing project, drivers who would otherwise not pay a toll and who may not have a convenient transit alternative would lose an existing affordable option. The Guiding Principles Assessment seeks to bring to attention that such a project has impacts that do not support the Affordable principle.</p>
<p><b>Healthy: We could imagine a project that would significantly increase VMT (and potentially trigger higher rates of collisions) but, depending on assumptions about EV adoption, could still result in a net decrease in emissions. How will MTC address these tradeoffs since a healthy transportation system isn't as straightforward as simply looking at emission reductions?</b></p>	<p>The Guiding Principles Assessment checks for alignment with principles with respect to a no-project scenario in the horizon year, within the same future. A project that significantly increases VMT relative to the no-project scenario would increase emissions regardless of the EV assumptions.</p> <p>Further, based on this feedback, we have added an evaluation question based on collisions to the 'Healthy' principle, please refer to the updated table F.1.</p>
<p><b>Recommend penalizing flagged projects only if they are on the margin of the benefit-cost threshold for high performance - Flagged projects close to the threshold could move out of the high priority category, and non-flagged projects just below the threshold could move into the high priority category.</b></p>	<p>The Guiding Principles Assessment will be applied uniformly to all projects, independent of the Benefit-Cost Assessment, to highlight potential impacts that may not be captured within the Benefit-Cost Assessment. The framework for evaluation of projects based on the results of all three assessments (Benefit-Cost Assessment, Guiding Principles Assessment and Equity Assessment) will ultimately be set by the MTC Planning Committee in 2019.</p>

## Equity Assessment

Feedback	MTC Response
<p><b>Number of Jobs within 30 mins of transit for areas with higher than average percent of low income households, elderly population, population with disabilities.</b></p>	<p>Please refer to the Attachment F in the document for the updated methodology. We may explore more methods such as this down the road, especially related to the futures equity assessment, but are unable to commit to such methods as of now due to resource constraints.</p>
<p><b>Please confirm you will use the Communities of Concern (COC)</b></p>	<p>Yes, confirmed. Also, we will update the definitions using latest available demographic data when we conduct the assessment.</p>

Feedback	MTC Response
<p>definitions approved earlier this year by the SFCTA Board and by MTC staff.</p>	
<p>How will equity analysis consider exposure/proximity (emissions, noise)? Are emissions quantified at regional level, or sub-regional level? Is there an emissions exposure component to the equity analysis to capture negative health effects?</p>	<p>Emissions are quantified only at the regional level for the Project Performance Assessment. We do not have a methodology or resources to capture effects of emissions or noise at a sub-regional level to conduct such an equity analysis. Hence, the equity analysis at the project level will not consider exposure/proximity, with the exception of transit access points in COCs.</p>
<p>Is equity analysis focused on accessibility (as the analysis in PBA 2040 did)?</p>	<p>The analysis in PBA 2040 focused more on geographic location of transit access points. While we will repeat this assessment, we have also proposed a new methodology (to be tested for feasibility) that focuses on accessibility impacts across income groups.</p>
<p>Will this assessment use disaggregate activity based model (ABM) outputs rather than aggregate geographic outputs?</p>	<p>Yes, the new methodology outlined for the equity assessment relies on these disaggregate outputs. Please note that model outputs (i.e. change in logsums) are “disaggregate” in that they represent an average household belonging to a specific income group within each TAZ. They are not fully disaggregate for each individual household.</p>
<p>Could equity analysis be more rigorous that “targets assessment” (i.e. incorporate data from BCA more directly/explicitly)? Could equity analysis exploit disaggregate nature of Travel Model Two rather than rely on aggregate COC geographies, to avoid aggregation biases?</p>	<p>Yes, the new methodology attempts to do this.</p>
<p>Prior COC analysis has acknowledged that half of Bay Area population qualifying for low income/minority status under the COC definition live outside of COCs. How will the equity analysis capture benefits of projects to that population?</p>	<p>We hope to overcome this issue with the proposed methodology. The methodology calculates total change in accessibility benefits of people belonging to different income quantiles, regardless of their location in the Bay Area.</p>
<p>When will the Regional Equity Working Group (REWG) be convened to allow the community to discuss these important considerations for a significant portion of the Region’s population?</p>	<p>Equity stakeholders have been invited and are welcome to attend the RAWG meetings and provide feedback. As needed, equity stakeholders will convene as a working group during the PBA 2050 process.</p>
<p>Fundamental to the success of the Sustainable Communities Strategy is the performance of Priority Development Areas (PDAs) in meeting the goals of VMT reduction, inclusive housing for all, adequate levels of transit service, various community amenities, and resistance to sea level rise. Yet the methodology and current documentation address these key issues to a limited extent, if at all.</p>	<p>This is not within the scope of Project Performance Assessment, and will be addressed during PBA 2050. This topic is also being discussed in the development of the Perspective Paper on Regional Growth Strategies.</p>
<p>Finally, we are attaching two letters sent to MTC earlier this year which</p>	<p>Thank you for your input on PBA 2050. Horizon attempts to set a stage for the development of the plan and we look forward to taking this</p>

Feedback	MTC Response
<b>provide information that makes it clear PBA 2050 needs to be significantly different from PBA 2040 if the Sustainable Communities Strategy is to be a success.</b>	feedback and working with all stakeholders during the PBA 2050 process.

# Appendix 2 Project Performance Final Findings

## Horizon/Plan Bay Area 2050: Final Project Performance Findings

### Attachment A: Overall Summary Table

#### Benefit-Cost Ratios and Equity Scores across Three Futures, and Guiding Principle Flags

Total number of projects: 97; 81 projects from public agencies, 12 projects (along with 4 alternate versions) from public/NGOs that were jury finalists from the Transformative Projects process. (see high-level description of methodology at the bottom of the page)



Project Type	Project ID	Row ID	Project	Project Source	Lifecycle Cost	Guiding Principle Flags	Benefit-Cost Ratio			Equity Score		
							Rising Tides Falling Fortunes	Clean And Green	Back To The Future	Rising Tides Falling Fortunes	Clean And Green	Back To The Future
Build Core Rail	1004	1	New San Francisco-Oakland Transbay Rail Crossing - Commuter Rail (Crossing 5)	Crossings Study	\$46.1B	2	0.7	2	2	Even	Even	Even
	1007	2	New San Francisco-Oakland Transbay Rail Crossing - BART + Commuter Rail (Crossing 7)	Crossings Study	\$83.5B	2	0.6	1	1	Even	Even	Even
	1002	3	New San Francisco-Oakland Transbay Rail Crossing - BART (Crossing 3: Mission St)	Crossings Study	\$36.2B	0	0.6	1	1	Even	Even	Even
	1003	4	New San Francisco-Oakland Transbay Rail Crossing - BART (Crossing 4: New Markets)	Crossings Study	\$37.4B	0	0.6	1	1	Even	Even	Even
	2300	5	Caltrain Downtown Extension	TAPA	\$4.8B	0	<0.5	0.7	0.6	Challenges	Challenges	Challenges
	2205	6	BART to Silicon Valley (Phase 2)	VTA	\$6.0B	0	<0.5	<0.5	0.6	Advances	Advances	Even
	2306	7	Dumbarton Rail (Redwood City to Union City)	SanTrans + CCAAG	\$3.9B	0	<0.5	<0.5	0.5	Even	Even	Challenges
	2310	8	Megaregional Rail Network + Resilience Project (Caltrain, ACE, Valley Link, Dumbarton, Cap Cor)	City of San Jose	\$54.1B	2	<0.5	0.5	<0.5	Challenges	Challenges	Challenges
	2208	9	BART Gap Closure (Millbrae to Silicon Valley)	VTA	\$40.4B	0	<0.5	<0.5	<0.5	Advances	Advances	Even
	6002	10	SMART to Richmond via New Richmond-San Rafael Bridge	Public/NGO Submission	\$5.0B	2	<0.5	<0.5	<0.5	Challenges	Challenges	Challenges
Extend Rail Network - High Cost	2308	11	Valley Link (Dublin to San Joaquin Valley)	TVS/JVRRRA	\$3.0B	0	<0.5	1	1	Even	Even	Even
	2309	12	Altamont Corridor Vision Phase 1 (to San Joaquin Valley)	TVS/JVRRRA, SJRRC	\$4.6B	0	<0.5	0.6	0.7	Challenges	Challenges	Challenges
	2206	13	BART Extension from Diridon to Cupertino	VTA	\$12.1B	0	<0.5	<0.5	<0.5	Even	Advances	Even
	2207	14	BART Extension from Diridon to Gilroy (replacing existing Caltrain)	VTA	\$17.7B	1	<0.5	<0.5	<0.5	Even	Advances	Even
	2204	15	BART to 680 (Walnut Creek to West Dublin/Pleasanton)	Caltrans	\$11.0B	0	<0.5	<0.5	<0.5	Even	Even	Even
	2203	16	BART to Hercules & I-80 Bus from Vallejo to Oakland	CCTA	\$5.8B	0	<0.5	<0.5	<0.5	Challenges	Challenges	Challenges
	2312	17	ACE Rail Service Increase (10 Daily Roundtrips)	SJRRC	\$1.3B	0	<0.5	1	1	Challenges	Challenges	Challenges
	2202	18	BART DMU Extension to Brentwood	CCTA	\$0.6B	0	<0.5	0.5	<0.5	Advances	Challenges	Challenges
	2305	19	SMART to Solano (Novato to Suisun City, without sea level rise protections)	SMART	\$1.6B	0	<0.5	<0.5	<0.5	Even	Challenges	Challenges
	2304	20	SMART Extension to Cloverdale	SMART	\$0.5B	0	<0.5	<0.5	<0.5	Challenges	Even	Challenges
Optimize Existing Transit Network - High Cost	2201	21	BART Core Capacity	BART	\$4.5B	0	1	2	2	Even	Even	Even
	2001	22	AC Transit Local Rapid Network: Capital Improvements + Service Increase	AC Transit	\$6.4B	0	0.5	0.6	0.8	Advances	Advances	Even
	2209	23	Caltrain Full Electrification and Blended System: High Growth	VTA, City of San Jose	\$31.3B	2	<0.5	1	0.5	Challenges	Even	Challenges
	2002	24	Caltrain Full Electrification and Blended System: Moderate Growth	Caltrain + HSR	\$24.6B	2	<0.5	0.9	0.5	Challenges	Even	Challenges
	2005	25	Alameda County BRT Network + Connected Vehicle Corridors	ACTC	\$4.0B	0	<0.5	<0.5	0.6	Advances	Advances	Even
	2410	26	VTA LRT Systemwide Grade Separation and Full Automation	City of San Jose	\$14.8B	1	<0.5	<0.5	0.7	Advances	Advances	Even
	2409	27	VTA LRT Systemwide Grade Separation	VTA	\$11.6B	0	<0.5	<0.5	0.5	Advances	Advances	Even
	2401	28	North San Jose LRT Subway	VTA	\$4.9B	0	<0.5	<0.5	0.5	Even	Advances	Even
	2411	29	VTA LRT Systemwide Grade Separation, Network Expansion, and Full Automation	VTA, City of San Jose	\$44.2B	0	<0.5	<0.5	<0.5	Advances	Advances	Even
	2407	30	Muni Metro Southwest M-Line Subway	SFCTA	\$5.6B	0	<0.5	<0.5	<0.5	Advances	Advances	Challenges
2301	31	Caltrain Full Electrification and Blended System: Base Growth	Caltrain + HSR	\$20.9B	2	<0.5	<0.5	<0.5	Even	Even	Even	

**Lifecycle Costs:** This includes initial capital cost, annual O&M costs, rehabilitation and replacements costs, and a residual value of the investment at the end of the analysis period, calculated using discounted present value methodology. Refer to Attachment D for details, and for costs as reviewed with sponsors. Note: Societal transfers such as fare/toll revenue (or loss) are excluded from both benefits and costs, following standard practice for societal benefit-cost analyses.

**Guiding Principle Flags:** Flags, based on qualitative analysis, are intended to draw attention to a direct adverse impact a project may have that may not be captured as part of other assessments. Refer to Attachment C for details.

**Benefit-Cost Ratio:** All project impacts are measured against a uniform base transportation and land use network in each future, except Resilience projects, which are measured against a baseline where that asset is out of service (hence n/a in some futures). Costs and Benefits to determine the ratio are detailed in Attachment D and E. For inter-regional projects, modeled Bay Area benefits have been multiplied by a factor to reflect the ratio of expected ridership from outside the region. Valley Link/ACE Rail benefit multiplier: 3.3; Caltrain/HSR benefit multiplier: 1.3 (the HSR multiplier is applied in Clean and Green only, the Future where HSR is completely built out).

**Equity Score:** "Advances" indicates that the project may benefit lower income individuals (below regional median income) more than higher income individuals. "Challenges" indicates that project benefits skew towards higher income individuals. "Even" indicates even distribution of benefits for all income groups.

**Notes on Bicycle Projects:** Improvements to individual bicycle facilities cannot be sufficiently modeled using Travel Model 1.5 (except Bay Bridge West Span since this opens up a connection); Travel Model 2.0 (under development) may allow more advanced analysis in the future. As an interim solution, a single "Enhanced Regionwide Bike Infrastructure" (Project ID 6006) was modeled, supported by off-model assertions based on research literature review. This project does not consider any specific improvements, but instead provides perspective on the benefits of a regionwide bike infrastructure investment (e.g. shared streets, trails, superhighways) on our transportation system. (Full methodology can be found here: [https://mtc.ca.gov/sites/default/files/ProjectPerformance\\_Methodology.pdf](https://mtc.ca.gov/sites/default/files/ProjectPerformance_Methodology.pdf))

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## Horizon/Plan Bay Area 2050: Final Project Performance Findings

### Attachment A: Overall Summary Table

#### Benefit-Cost Ratios and Equity Scores across Three Futures, and Guiding Principle Flags

Total number of projects: 97; 81 projects from public agencies, 12 projects (along with 4 alternate versions) from public/NGOs that were jury finalists from the Transformative Projects process. (see high-level description of methodology at the bottom of the page)



Project Type	Project ID	Row ID	Project	Project Source	Lifecycle Cost	Guiding Principle Flags	Benefit-Cost Ratio			Equity Score		
							Rising Tides Falling Fortunes	Clean And Green	Back To The Future	Rising Tides Falling Fortunes	Clean And Green	Back To The Future
Optimize Existing Transit Network - Low Cost	3001	32	Downtown San Francisco Congestion Pricing	SF	\$0.8B	1	8	7	>10	Challenges	Challenges	Challenges
	6111	33	Integrated Transit Fare System (with Transit Capacity Expansion)	Public/NGO Submission	\$0.3B	0	6	7	>10	Advances	Advances	Advances
	6112	34	Integrated Transit Fare System and Seamless Transfers (with Transit Capacity Expansion)	Public/NGO Submission	\$0.5B	0	5	7	>10	Advances	Advances	Advances
	2209	35	Innovation BART 16th Station	ACTC	\$0.2B	0	1	1	8	Even	Even	Even
	3002	36	Treasure Island Congestion Pricing	SF	\$0.3B	1	2	3	4	Challenges	Challenges	Challenges
	2007	37	San Francisco Southeast Waterfront Transit Improvements	SF	\$0.6B	0	2	3	4	Even	Even	Even
	2100	38	San Pablo BRT	AC Transit	\$0.5B	0	1	3	4	Advances	Advances	Even
	2008	39	Alameda Point Transit Network Improvements	ACTC	\$0.5B	0	0.7	3	4	Even	Even	Even
	2000	40	AC Transit Local Network: Service Increase	AC Transit	\$2.6B	0	1	2	2	Advances	Advances	Even
	2101	41	Coastal BRT (Phase 2)	SF	\$0.6B	0	1	2	3	Even	Even	Challenges
Notes on Bicycle Projects	2105	42	Alameda County E14th St/Mission and Fremont Blvd Multimodal Corridor	ACTC	\$0.5B	0	1	2	2	Advances	Advances	Even
	2103	43	SanTrans El Camino Real BRT: Capital and Service Improvements	CCAG	\$0.6B	0	1	1	2	Advances	Even	Challenges
	2003	44	Muni Forward: Capital Improvements + Service Increase	SF	\$2.9B	0	0.7	2	1	Even	Even	Even
	6100	45	Integrated Transit Fare System	Public/NGO Submission	\$0.3B	0	2	<0.5	5	Advances	Advances	Advances
	2004	46	Sonoma Countywide Bus Service Increase	SCTA	\$0.9B	0	<0.5	<0.5	1	Advances	Even	Even
	2400	47	Downtown San Jose LRT Subway	VTA	\$1.9B	0	<0.5	<0.5	1	Even	Even	Even
	6106	48	Free Transit for Low-Income Households	Public/NGO Submission	\$0.1B	0	<0.5	<0.5	<0.5	Advances	Advances	Advances
	6101	49	Free Transit for All	Public/NGO Submission	\$0.1B	1	<0.5	<0.5	<0.5	Advances	Advances	Advances
	4000	50	Oakland/Alameda Gondola Network	City of Oakland	\$1.1B	1	0.7	<0.5	2	Even	Advances	Even
	Build Local Transit	4001	51	Mountain View AV Network (Free Fare, Subsidies from Companies)	City of Mountain View	\$1.4B	1	<0.5	0.9	1	Advances	Advances
2403		52	Yavona LRT Extension (Phase 2)	VTA	\$0.3B	0	0.7	<0.5	1	Advances	Advances	Even
2412		53	SJRRC LRT (Mountain View to US101 interchange)	City of Cupertino	\$2.7B	0	<0.5	0.7	0.5	Even	Challenges	Even
2408		54	Muni Metro T-Third Extension to South San Francisco	City of South San Fran.	\$1.8B	0	<0.5	<0.5	1	Challenges	Challenges	Even
4002		55	Contra Costa Autonomous Shuttle Program	CCTA	\$3.4B	0	<0.5	<0.5	<0.5	Advances	Even	Challenges
4003		56	Cupertino Mountain View San Jose Elevated Maglev Rail Loop	City of Cupertino	\$8.1B	1	<0.5	<0.5	<0.5	Challenges	Challenges	Challenges
2402		57	San Jose Airport People Mover	VTA	\$1.4B	0	<0.5	<0.5	<0.5	Even	Challenges	Even
2600		58	WETA Ferry Service Frequency Increase	WETA	\$0.4B	0	2	6	3	Challenges	Even	Even
4006		59	Enhanced Regionwide Bike Infrastructure	MTCC/ABAG	\$12.6B	0	1	3	3	Advances	Advances	Advances
2602		60	WETA Ferry Service: Berkeley - San Francisco	WETA	\$0.2B	0	<0.5	1	1	Advances	Even	Even
2700	61	Bay Bridge West Span Bike Path	MTCC/ABAG	\$0.8B	0	<0.5	1	0.5	Even	Challenges	Challenges	
2603	62	WETA Ferry Service: Redwood City - San Francisco - Oakland	WETA	\$0.3B	0	0.6	0.6	<0.5	Even	Even	Even	
4004	63	Regional Hovercraft Network	CCAG	\$2.6B	0	<0.5	0.6	<0.5	Even	Challenges	Advances	
6004	64	Bay Trail Completion	Public/NGO Submission	n/a	0	cannot be modeled			cannot be modeled			
6005	65	Regional Bicycle Superhighway Network	Public/NGO Submission	n/a	0	cannot be modeled			cannot be modeled			

**Lifecycle Costs:** This includes initial capital cost, annual O&M costs, rehabilitation and replacements costs, and a residual value of the investment at the end of the analysis period, calculated using discounted present value methodology. Refer to Attachment D for details, and for costs as reviewed with sponsors. Note: Societal transfers such as fare/toll revenue (or loss) are excluded from both benefits and costs, following standard practice for societal benefit-cost analyses.

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Horizon/Plan Bay Area 2050: Final Project Performance Findings  
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Build Road Capacity - High Cost	1001	66	Southern Crossing Bridge + New San Francisco-Oakland Transbay Rail Crossing - BART (Crossin...	Crossings Study	\$47.1B	1	0.6	1	2	Even	Even	Even
	3000	67	Regional Express Lanes (MTC + VTA + ACT + US-101)	MTC/ABAG	\$12.1B	1	0.5	0.6	2	Challenges	Challenges	Challenges
	1005	68	Mid-Bay Bridge (I-238 to I-380) (Crossing 2)	Crossings Study	\$19.9B	2	<0.5	<0.5	1	Even	Challenges	Even
Build Road Capacity - Low Cost	1006	69	San Mateo Bridge Reconstruction and Widening (Crossing 1)	Crossings Study	\$15.7B	1	<0.5	<0.5	<0.5	Advances	Challenges	Even
	3101	70	I-680/SR-4 Interchange Improvements (Direct/HOV Connectors, Ramp Widening, Auxiliary Lan...	CTCA	\$0.4B	1	<0.5	2	3	Even	Challenges	Even
	3110	71	Union City-Fremont East-West Connector	ACTC	\$0.4B	1	0.7	1	3	Even	Even	Even
	3102	72	SR-4 Operational Improvements	CTCA	\$0.5B	1	<0.5	1	2	Challenges	Challenges	Even
	3104	73	I-80/I-680/SR-12 Interchange + Widening (Phases 2B-7)	STA	\$0.7B	2	<0.5	1	1	Challenges	Even	Even
	3103	74	SR-4 Widening (Brentwood to Discovery Bay)	CTCA	\$0.4B	1	<0.5	<0.5	6	Advances	Even	Challenges
	3106	75	SR-152 Realignment and Tolling	VTA	\$1.9B	2	2	<0.5	<0.5	Even	Challenges	Even
	3109	76	SR-262 Widening and Interchange Improvements	ACTC	\$1.2B	2	<0.5	<0.5	1	Even	Even	Challenges
	3100	77	SR-239 Widening (Brentwood to Tracy including Airport Connector)	CTCA	\$2.4B	1	<0.5	<0.5	0.9	Challenges	Advances	Challenges
	3105	78	SR-12 Widening (I-80 to Rio Vista)	STA	\$2.5B	2	<0.5	<0.5	0.7	Even	Challenges	Even
Optimize Existing Freeway Network	5000	79	Bay Area Forward (Phase 1: Freeway Ramp and Arterial Components Only)	MTC/ABAG	\$0.6B	1	7	9	5	Challenges	Challenges	Challenges
	6103	80	Demand-Based Tolling on All Highways with Means-Based Tolls	Public/NGO Submission	\$7.7B	1	2	0.8	9	Even	Even	Even
	6102	81	HOV Lane Network with per-mile fee for SOVs	Public/NGO Submission	\$7.7B	1	2	<0.5	5	Challenges	Challenges	Challenges
	3003	82	San Francisco Arterial HOV and Freeway HOT Lanes	SF	\$1.3B	0	0.5	0.9	3	Challenges	Challenges	Even
	2002	83	AC Transit Transbay Network: Capital Improvements + Service Increase	AC Transit	\$6.5B	0	0.5	0.8	1	Challenges	Challenges	Challenges
	6022	84	Bus Rapid Transit (BRT) on All Bridges: Dedicated Lanes + Service/Capacity Improvements	Public/NGO Submission	\$1.2B	0	0.6	1	<0.5	Advances	Advances	Even
	6020	85	Regional Express (ReX) Bus Network + Optimized Express Lane Network	Public/NGO Submission	\$41.0B	1	<0.5	0.7	0.5	Challenges	Challenges	Challenges
	5003	86	I-680 Corridor Improvements (BRT, Express Bus, Shared AVs, Gondolas)	CTCA	\$4.6B	0	<0.5	0.5	0.6	Even	Even	Even
	6104	87	Reversible Lanes on Top 10 Congested Bridges and Freeways	Public/NGO Submission	\$2.4B	1	<0.5	<0.5	<0.5	Challenges	Even	Advances
	6003	88	I-80 Corridor Overhaul with Per-Mile Tolling	Public/NGO Submission	\$3.9B	1	<0.5	<0.5	<0.5	Even	Challenges	Challenges
Resilience	6021	89	Bus Rapid Transit (BRT) on All Bridges: Dedicated Lanes only	Public/NGO Submission	\$0.2B	0	<0.5	<0.5	<0.5	Advances	Advances	Even
	6105	90	Timing Regulation of Freight Delivery	Public/NGO Submission	n/a	1	cannot be modelled			cannot be modelled		
	7002	91	I-580/US-101/SMART Marin Resilience Project	MTC/ABAG/BCDC	\$0.2B	0	>10	>20	>10	Challenges	Challenges	Challenges
	7005	92	SR-237 Resilience Project (Alviso)	MTC/ABAG/BCDC	\$0.2B	0	>10	n/a	>10	Even	n/a	Even
	7006	93	I-880 Resilience Project (South Fremont)	MTC/ABAG/BCDC	\$0.1B	0	>10	n/a	n/a	Challenges	n/a	n/a
	7004	94	SR-84 Resilience Project (Dumbarton Bridge, 101 Interchange)	MTC/ABAG/BCDC	\$0.2B	0	>10	n/a	n/a	Challenges	n/a	n/a
	7003	95	US-101 Peninsula Resilience Project (San Antonio Rd, Poplar Ave, Millbrae Ave)	MTC/ABAG/BCDC	\$0.2B	0	>10	n/a	n/a	Challenges	n/a	n/a
	7001	96	VTA LRT Resilience Project (Tasman West)	MTC/ABAG/BCDC	\$0.2B	0	5	5	8	Even	Advances	Even
	3200	97	SR-37 Long Term Project (Tolling, Elevation, Interchanges, Widening, Express Bus)	MTC/ABAG/North Bay ..	\$6.0B	2	2	2	2	Challenges	Challenges	Challenges

**Lifecycle Costs:** This includes initial capital cost, annual O&M costs, rehabilitation and replacements costs, and a residual value of the investment at the end of the analysis period, calculated using discounted present value methodology. Refer to Attachment D for details, and for costs as reviewed with sponsors. Note: Social transfers such as fare/toll revenue (or loss) are excluded from both benefits and costs, following standard practice for societal benefit-cost analysis.

**Guiding Principle Flags:** Flags, based on qualitative analysis, are intended to draw attention to a direct adverse impact a project may have that may not be captured as part of other assessments. Refer to Attachment C for details.

**Benefit-Cost Ratio:** All project impacts are measured against a uniform base transportation and land use network in each future, except Resilience projects, which are measured against a baseline where that asset is out of service (hence n/a in some futures). Costs and Benefits to determine the ratio are detailed in Attachment D and E. For inter-regional projects, modeled Bay Area benefits have been multiplied by a factor to reflect the ratio of expected ridership from outside the region. Valley Link/ACE Rail benefit multiplier: 3.3; Caltrain/HSR benefit multiplier: 1.3 (the HSR multiplier is applied in Clean and Green only, the Future where HSR is completely built out).

**Equity Score:** "Advances" indicates that the project may benefit lower income individuals (below regional median income) more than higher income individuals. "Challenges" indicates that project benefits skew towards higher income individuals. "Even" indicates even distribution of benefits for all income groups.

**Note on Bicycle Projects:** Improvements to individual bicycle facilities cannot be sufficiently modeled using Travel Model 1.5 (except Bay Bridge West Span since this opens up a connection). Travel Model 2.0 (under development) may allow more advanced analysis in the future. As an interim solution, a single "Enhanced Regionalist Bike Infrastructure" (Project ID 6006) was modeled, supported by off-model assertions based on research literature review. This project does not consider any specific improvements, but instead provides perspective on the benefits of a regionwide bike infrastructure investment (e.g. shared streets, trails, superhighways) on our transportation system. (Full methodology can be found here: [https://mtc.ca.gov/sites/default/files/ProjectPerformance\\_Methodology.pdf](https://mtc.ca.gov/sites/default/files/ProjectPerformance_Methodology.pdf))

Horizon/Plan Bay Area 2050: Final Project Performance Findings  
Attachment B: Guiding Principles and Equity Summary Table



Total number of projects: 97; 81 projects from public agencies, 12 projects (along with 4 alternate versions) from public/NGOs that were jury finalists from the Transformative Projects process. (see high-level description of methodology at the bottom of the page)

Project ID	Row ID	Project	Project Type	Lifecycle Cost	Guiding Principle Flags	Provides Point of Access in CoC?	Equity Score		
							Rising Tides Falling Fortunes	Clean And Green	Back To The Future
6106	1	Free Transit for Low-Income Households	Optimize Existing Transit Network - Low Cost	\$0.1B	0	Yes	Advances	Advances	Advances
6101	2	Free Transit for All	Optimize Existing Transit Network - Low Cost	\$0.1B	1	Yes	Advances	Advances	Advances
6006	3	Enhanced Regionwide Bike Infrastructure	Enhance Alternate Modes	\$12.6B	0	Yes	Advances	Advances	Advances
6100	4	Integrated Transit Fare System	Optimize Existing Transit Network - Low Cost	\$0.3B	0	Yes	Advances	Advances	Advances
6111	5	Integrated Transit Fare System (with Transit Capacity Expansion)	Optimize Existing Transit Network - Low Cost	\$0.3B	0	Yes	Advances	Advances	Advances
6112	6	Integrated Transit Fare System and Seamless Transfers (with Transit Capacity Expansion)	Optimize Existing Transit Network - Low Cost	\$0.5B	0	Yes	Advances	Advances	Advances
4001	7	Mountain View AV Network (Free Fare, Subsidies from Companies)	Build Local Transit	\$1.4B	1	No	Advances	Advances	Advances
2100	8	San Pablo BRT	Optimize Existing Transit Network - Low Cost	\$0.5B	0	Yes	Advances	Advances	Even
2001	9	AC Transit Local Rapid Network: Capital Improvements + Service Increase	Optimize Existing Transit Network - High Cost	\$6.4B	0	Yes	Advances	Advances	Even
6021	10	Bus Rapid Transit (BRT) on All Bridges: Dedicated Lanes only	Optimize Existing Freeway Network	\$0.2B	0	Yes	Advances	Advances	Even
6022	11	Bus Rapid Transit (BRT) on All Bridges: Dedicated Lanes + Service/Capacity Improvements	Optimize Existing Freeway Network	\$1.2B	0	Yes	Advances	Advances	Even
2000	12	AC Transit Local Network: Service Increase	Optimize Existing Transit Network - Low Cost	\$2.6B	0	Yes	Advances	Advances	Even
2409	13	VTA LRT Systemwide Grade Separation	Optimize Existing Transit Network - High Cost	\$11.6B	0	Yes	Advances	Advances	Even
2005	14	Alameda County BRT Network + Connected Vehicle Corridors	Optimize Existing Transit Network - High Cost	\$4.0B	0	Yes	Advances	Advances	Even
2208	15	BART Gap Closure (Millbrae to Silicon Valley)	Build Core Rail	\$40.4B	0	Yes	Advances	Advances	Even
2403	16	Vasona LRT Extension (Phase 2)	Build Local Transit	\$0.3B	0	Yes	Advances	Advances	Even
2410	17	VTA LRT Systemwide Grade Separation and Full Automation	Optimize Existing Transit Network - High Cost	\$14.8B	1	Yes	Advances	Advances	Even
2411	18	VTA LRT Systemwide Grade Separation, Network Expansion, and Full Automation	Optimize Existing Transit Network - High Cost	\$44.2B	0	Yes	Advances	Advances	Even
2205	19	BART to Silicon Valley (Phase 2)	Build Core Rail	\$6.0B	0	Yes	Advances	Advances	Even
2105	20	Alameda County E14th St/Mission and Fremont Blvd Multimodal Corridor	Optimize Existing Transit Network - Low Cost	\$0.5B	0	Yes	Advances	Advances	Even
2407	21	Muni Metro Southwest M-Line Subway	Optimize Existing Transit Network - High Cost	\$5.6B	0	No	Advances	Advances	Challenges
2602	22	WETA Ferry Service: Berkeley - San Francisco	Enhance Alternate Modes	\$0.2B	0	Yes	Advances	Even	Even
2004	23	Sonoma Countywide Bus: Service Increase	Optimize Existing Transit Network - Low Cost	\$0.9B	0	Yes	Advances	Even	Even
2401	24	North San Jose LRT Subway	Optimize Existing Transit Network - High Cost	\$4.9B	0	Yes	Even	Advances	Even
2207	25	BART Extension from Diridon to Gilroy (replacing existing Caltrain)	Extend Rail Network - High Cost	\$17.7B	1	Yes	Even	Advances	Even
4000	26	Oakland/Alameda Gondola Network	Build Local Transit	\$1.1B	1	Yes	Even	Advances	Even
2206	27	BART Extension from Diridon to Cupertino	Extend Rail Network - High Cost	\$12.1B	0	No	Even	Advances	Even
7001	28	VTA LRT Resilience Project (Tasman West)	Resilience	\$0.2B	0	No	Even	Advances	Even
1003	29	New San Francisco-Oakland Transbay Rail Crossing - BART (Crossing 4: New Markets)	Build Core Rail	\$37.4B	0	Yes	Even	Even	Even
2209	30	Irvington BART Infill Station	Optimize Existing Transit Network - Low Cost	\$0.2B	0	No	Even	Even	Even
1002	31	New San Francisco-Oakland Transbay Rail Crossing - BART (Crossing 3: Mission St)	Build Core Rail	\$36.2B	0	Yes	Even	Even	Even
2007	32	San Francisco Southeast Waterfront Transit Improvements	Optimize Existing Transit Network - Low Cost	\$0.6B	0	Yes	Even	Even	Even
2003	33	Muni Forward: Capital Improvements + Service Increase	Optimize Existing Transit Network - Low Cost	\$2.9B	0	Yes	Even	Even	Even

**Equity Score**  
"Advances" indicates that the project may benefit lower income individuals (below regional median income) more than higher income individuals.  
"Challenges" indicates that project benefits skew towards higher income individuals.  
"Even" indicates even distribution of benefits for all income groups.

**Provides Point of Access in CoC (Plan Bay Area 2040/legacy equity methodology)**  
This analysis is similar to what was done in Plan Bay Area 2040, indicating whether a project provides an access point (such as a station or new roadway facility) in a Community of Concern (CoC definition updated with 2018 ACS data). However, unlike the equity score, this does not reflect which population groups might actually benefit from the project.  
\* While Valley Link/ACE Rail projects do not have any stations in Communities of Concern in the Bay Area, they do have stations located in Disadvantaged Communities in the San Joaquin Valley.

## Horizon/Plan Bay Area 2050: Final Project Performance Findings Attachment B: Guiding Principles and Equity Summary Table



Total number of projects: 97; 81 projects from public agencies, 12 projects (along with 4 alternate versions) from public/NGOs that were jury finalists from the Transformative Projects process. (see high-level description of methodology at the bottom of the page)

Project ID	Row ID	Project	Project Type	Lifecycle Cost	Guiding Principle Flags	Provides Point of Access in CoC*	Equity Score		
							Rising Tides Falling Fortunes	Clean And Green	Back To The Future
1004	34	New San Francisco-Oakland Transbay Rail Crossing - Commuter Rail (Crossing 5)	Build Core Rail	\$46.1B	2	Yes	Even	Even	Even
2603	35	WETA Ferry Service: Redwood City - San Francisco - Oakland	Enhance Alternate Modes	\$0.3B	0	No	Even	Even	Even
1007	36	New San Francisco-Oakland Transbay Rail Crossing - BART + Commuter Rail (Crossing 7)	Build Core Rail	\$83.5B	2	Yes	Even	Even	Even
2308	37	Valley Link (Dublin to San Joaquin Valley)	Extend Rail Network - High Cost	\$3.0B	0	Yes*	Even	Even	Even
2301	38	Caltrain Full Electrification and Blended System: Base Growth	Optimize Existing Transit Network - High Cost	\$20.9B	2	Yes	Even	Even	Even
1001	39	Southern Crossing Bridge + New San Francisco-Oakland Transbay Rail Crossing - BART (Crossing 6)	Build Road Capacity - High Cost	\$47.1B	1	Yes	Even	Even	Even
5003	40	I-680 Corridor Improvements (BRT, Express Bus, Shared AVs, Gondolas)	Optimize Existing Freeway Network	\$4.6B	0	Yes	Even	Even	Even
2008	41	Alameda Point Transit Network Improvements	Optimize Existing Transit Network - Low Cost	\$0.5B	0	Yes	Even	Even	Even
2201	42	BART Core Capacity	Optimize Existing Transit Network - High Cost	\$4.5B	0	Yes	Even	Even	Even
2204	43	BART on I-680 (Walnut Creek to West Dublin/Pleasanton)	Extend Rail Network - High Cost	\$11.0B	0	No	Even	Even	Even
3110	44	Union City-Fremont East-West Connector	Build Road Capacity - Low Cost	\$0.4B	1	No	Even	Even	Even
6103	45	Demand-Based Tolling on All Highways with Means-Based Tolls	Optimize Existing Freeway Network	\$7.7B	1	Yes	Even	Even	Even
2400	46	Downtown San Jose LRT Subway	Optimize Existing Transit Network - Low Cost	\$1.9B	0	Yes	Even	Even	Even
7005	47	SR-237 Resilience Project (Alviso)	Resilience	\$0.2B	0	No	Even	n/a	Even
4004	48	Regional Hovercraft Network	Enhance Alternate Modes	\$2.6B	0	Yes	Even	Challenges	Advances
1006	49	San Mateo Bridge Reconstruction and Widening (Crossing 1)	Build Road Capacity - High Cost	\$15.7B	1	Yes	Advances	Challenges	Even
4002	50	Contra Costa Autonomous Shuttle Program	Build Local Transit	\$3.4B	0	Yes	Advances	Even	Challenges
3103	51	SR-4 Widening (Brentwood to Discovery Bay)	Build Road Capacity - Low Cost	\$0.4B	1	Yes	Advances	Even	Challenges
2103	52	SanTrans El Camino Real BRT: Capital and Service Improvements	Optimize Existing Transit Network - Low Cost	\$0.6B	0	Yes	Advances	Even	Challenges
6104	53	Reversible Lanes on Top 10 Congested Bridges and Freeways	Optimize Existing Freeway Network	\$2.4B	1	Yes	Challenges	Even	Advances
2600	54	WETA Ferry Service Frequency Increase	Enhance Alternate Modes	\$0.4B	0	Yes	Challenges	Even	Even
3104	55	I-80/I-680/SR-12 Interchange + Widening (Phases 2B-7)	Build Road Capacity - Low Cost	\$0.7B	2	Yes	Challenges	Even	Even
2412	56	SR-85 LRT (Mountain View to US101 interchange)	Build Local Transit	\$3.7B	0	No	Even	Challenges	Even
2402	57	San Jose Airport People Mover	Build Local Transit	\$1.4B	0	Yes	Even	Challenges	Even
3101	58	I-680/SR-4 Interchange Improvements (Direct/NOV Connectors, Ramp Widening, Auxiliary Lanes)	Build Road Capacity - Low Cost	\$0.4B	1	No	Even	Challenges	Even
3105	59	SR-12 Widening (I-80 to Rio Vista)	Build Road Capacity - Low Cost	\$2.5B	2	Yes	Even	Challenges	Even
1005	60	Mid-Bay Bridge (I-238 to I-380) (Crossing 2)	Build Road Capacity - High Cost	\$19.9B	2	Yes	Even	Challenges	Even
3106	61	SR-152 Realignment and Tolling	Build Road Capacity - Low Cost	\$1.9B	2	No	Even	Challenges	Even
3109	62	SR-262 Widening and Interchange Improvements	Build Road Capacity - Low Cost	\$1.2B	2	No	Even	Even	Challenges
2101	63	Geary BRT (Phase 2)	Optimize Existing Transit Network - Low Cost	\$0.6B	0	Yes	Even	Even	Challenges
2306	64	Dumbarton Rail (Redwood City to Union City)	Build Core Rail	\$3.9B	0	Yes	Even	Even	Challenges
2202	65	BART DMU Extension to Brentwood	Extend Rail Network - Low Cost	\$0.6B	0	No	Advances	Challenges	Challenges
3100	66	SR-239 Widening (Brentwood to Tracy including Airport Connector)	Build Road Capacity - Low Cost	\$2.4B	1	No	Challenges	Advances	Challenges

### Equity Score

"Advances" indicates that the project may benefit lower income individuals (below regional median income) more than higher income individuals.

"Challenges" indicates that project benefits skew towards higher income individuals.

"Even" indicates even distribution of benefits for all income groups.

### Provides Point of Access in CoC (Plan Bay Area 2040) legacy equity methodology

This analysis is similar to what was done in Plan Bay Area 2040, indicating whether a project provides an access point (such as a station or new roadway facility) in a Community of Concern (CoC definition updated with 2018 ACS data). However, unlike the equity score, this does not reflect which population groups might actually benefit from the project.

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## Horizon/Plan Bay Area 2050: Final Project Performance Findings Attachment B: Guiding Principles and Equity Summary Table



Total number of projects: 97; 81 projects from public agencies, 12 projects (along with 4 alternate versions) from public/NGOs that were jury finalists from the Transformative Projects process. (see high-level description of methodology at the bottom of the page)

Project ID	Row ID	Project	Project Type	Lifecycle Cost	Guiding Principle Flags	Provides Point of Access in CoC*	Equity Score		
							Rising Tides Falling Fortunes	Clean And Green	Back To The Future
3102	67	SR-4 Operational Improvements	Build Road Capacity - Low Cost	\$0.5B	1	Yes	Challenges	Challenges	Even
2408	68	Muni Metro T-Third Extension to South San Francisco	Build Local Transit	\$1.8B	0	Yes	Challenges	Challenges	Even
3003	69	San Francisco Arterial HOV and Freeway HOT Lanes	Optimize Existing Freeway Network	\$1.3B	0	Yes	Challenges	Challenges	Even
2303	70	Caltrain Full Electrification and Blended System: High Growth	Optimize Existing Transit Network - High Cost	\$31.3B	2	Yes	Challenges	Even	Challenges
2304	71	SMART Extension to Cloverdale	Extend Rail Network - Low Cost	\$0.5B	0	No	Challenges	Even	Challenges
2302	72	Caltrain Full Electrification and Blended System: Moderate Growth	Optimize Existing Transit Network - High Cost	\$24.6B	2	Yes	Challenges	Even	Challenges
2700	73	Bay Bridge West Span Bike Path	Enhance Alternate Modes	\$0.8B	0	Yes	Even	Challenges	Challenges
2305	74	SMART to Solano (Novato to Suisun City, without sea level rise protections)	Extend Rail Network - Low Cost	\$1.6B	0	Yes	Even	Challenges	Challenges
6003	75	I-80 Corridor Overhaul with Per-Mile Tolling	Optimize Existing Freeway Network	\$3.9B	1	Yes	Even	Challenges	Challenges
6020	76	Regional Express (ReX) Bus Network + Optimized Express Lane Network	Optimize Existing Freeway Network	\$41.0B	1	Yes	Challenges	Challenges	Challenges
2309	77	Altamont Corridor Vision Phase 1 (to San Joaquin Valley)	Extend Rail Network - High Cost	\$4.6B	0	Yes	Challenges	Challenges	Challenges
4003	78	Cupertino-Mountain View-San Jose Elevated Maglev Rail Loop	Build Local Transit	\$8.1B	1	Yes	Challenges	Challenges	Challenges
3200	79	SR-37 Long Term Project (Tolling, Elevation, Interchanges, Widening, Express Bus)	Resilience	\$6.0B	2	Yes	Challenges	Challenges	Challenges
2310	80	Megaregional Rail Network + Resilience Project (Caltrain, ACE, Valley Link, Dumbarton, Cap Cor)	Build Core Rail	\$54.1B	2	Yes	Challenges	Challenges	Challenges
2002	81	AC Transit Transbay Network: Capital Improvements + Service Increase	Optimize Existing Freeway Network	\$6.5B	0	Yes	Challenges	Challenges	Challenges
2300	82	Caltrain Downtown Extension	Build Core Rail	\$4.8B	0	No	Challenges	Challenges	Challenges
7002	83	I-580/US-101/SMART Marin Resilience Project	Resilience	\$0.2B	0	Yes	Challenges	Challenges	Challenges
2203	84	BART to Hercules + I-80 Bus from Vallejo to Oakland	Extend Rail Network - High Cost	\$5.8B	0	Yes	Challenges	Challenges	Challenges
3000	85	Regional Express Lanes (MTC + VTA + ACTC + US-101)	Build Road Capacity - High Cost	\$12.1B	1	Yes	Challenges	Challenges	Challenges
5000	86	Bay Area Forward (Phase 1: Freeway Ramp and Arterial Components Only)	Optimize Existing Freeway Network	\$0.6B	1	Yes	Challenges	Challenges	Challenges
2312	87	ACE Rail Service Increase (10 Daily Roundtrips)	Extend Rail Network - Low Cost	\$1.3B	0	Yes	Challenges	Challenges	Challenges
3001	88	Downtown San Francisco Congestion Pricing	Optimize Existing Transit Network - Low Cost	\$0.8B	1	Yes	Challenges	Challenges	Challenges
6002	89	SMART to Richmond via New Richmond-San Rafael Bridge	Build Core Rail	\$5.0B	2	Yes	Challenges	Challenges	Challenges
3002	90	Treasure Island Congestion Pricing	Optimize Existing Transit Network - Low Cost	\$0.3B	1	Yes	Challenges	Challenges	Challenges
6102	91	HOV Lane Network with per-mile fee for SOVs	Optimize Existing Freeway Network	\$7.7B	1	Yes	Challenges	Challenges	Challenges
7003	92	US-101 Peninsula Resilience Project (San Antonio Rd, Poplar Ave, Millbrae Ave)	Resilience	\$0.2B	0	Yes	Challenges	n/a	n/a
7006	93	I-880 Resilience Project (South Fremont)	Resilience	\$0.1B	0	Yes	Challenges	n/a	n/a
7004	94	SR-84 Resilience Project (Dumbarton Bridge, 101 Interchange)	Resilience	\$0.2B	0	Yes	Challenges	n/a	n/a
6004	95	Bay Trail Completion	Enhance Alternate Modes	n/a	0	Yes	cannot be modeled		
6005	96	Regional Bicycle Superhighway Network	Enhance Alternate Modes	n/a	0	Yes	cannot be modeled		
6105	97	Timing Regulation of Freight Delivery	Optimize Existing Freeway Network	n/a	1	Yes	cannot be modeled		

### Equity Score

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"Even" indicates even distribution of benefits for all income groups.

### Provides Point of Access in CoC (Plan Bay Area 2040) legacy equity methodology

This analysis is similar to what was done in Plan Bay Area 2040, indicating whether a project provides an access point (such as a station or new roadway facility) in a Community of Concern (CoC definition updated with 2018 ACS data). However, unlike the equity score, this does not reflect which population groups might actually benefit from the project.

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## Horizon/Plan Bay Area 2050: Final Project Performance Findings Attachment C: Detailed Table of Guiding Principle Flags



Total number of projects: 97; 81 projects from public agencies, 12 projects (along with 4 alternate versions) from public/NGOs that were jury finalists from the Transformative Projects process.  
Row IDs correspond to Attachment A.  
(see high-level description of methodology at the bottom of the page)

Project Type	Project ID	Row ID	Project	Affordable	Connected	Diverse	Healthy	Vibrant
<b>Build Core Rail</b>	1004	1	New San Francisco-Oakland Transbay Rail Crossing - Commuter Rail (Crossing 5)	Supports	Supports	Does Not Support	Supports	Does Not Support
	1007	2	New San Francisco-Oakland Transbay Rail Crossing - Commuter Rail (Crossing 7)	Supports	Supports	Does Not Support	Supports	Does Not Support
	1002	3	New San Francisco-Oakland Transbay Rail Crossing - BART (Crossing 3: Mission St)	Supports	Supports	Supports	Supports	Supports
	1003	4	New San Francisco-Oakland Transbay Rail Crossing - BART (Crossing 4: New Markets)	Supports	Supports	Supports	Supports	Supports
	2300	5	Caltrain Downtown Extension	Supports	Supports	Supports	Supports	Supports
	2205	6	BART to Silicon Valley (Phase 2)	Supports	Supports	Supports	Supports	Supports
	2306	7	Dumbarton Rail (Redwood City to Union City)	Supports	Supports	Supports	Supports	Supports
	2310	8	Megaregional Rail Network + Resilience Project (Caltrain, ACE, Valley Link, Dumbarton, Cap Cor)	Supports	Supports	Does Not Support	Supports	Does Not Support
	2208	9	BART Gap Closure (Millbrae to Silicon Valley)	Supports	Supports	Supports	Supports	Supports
	6002	10	SMART to Richmond via New Richmond-San Rafael Bridge	Supports	Supports	Does Not Support	Supports	Does Not Support
<b>Extend Rail Network - High Cost</b>	2308	11	Valley Link (Dublin to San Joaquin Valley)	Supports	Supports	Supports	Supports	Supports
	2309	12	Altamont Corridor Vision Phase 1 (to San Joaquin Valley)	Supports	Supports	Supports	Supports	Supports
	2206	13	BART Extension from Diridon to Cupertino	Supports	Supports	Supports	Supports	Supports
	2207	14	BART Extension from Diridon to Gilroy (replacing existing Caltrain)	Does Not Support	Supports	Supports	Supports	Supports
	2204	15	BART on I-680 (Walnut Creek to West Dublin/Pleasanton)	Supports	Supports	Supports	Supports	Supports
	2203	16	BART to Hercules & I-80 Bus from Vallejo to Oakland	Supports	Supports	Supports	Supports	Supports
<b>Extend Rail Network - Low Cost</b>	2312	17	ACE Rail Service Increase (10 Daily Roundtrips)	Supports	Supports	Supports	Supports	Supports
	2202	18	BART DMU Extension to Brentwood	Supports	Supports	Supports	Supports	Supports
	2305	19	SMART to Solano (Novato to Suisun City, without sea level rise protections)	Supports	Supports	Supports	Supports	Supports
	2304	20	SMART Extension to Cloverdale	Supports	Supports	Supports	Supports	Supports
<b>Optimize Existing Transit Network - High Cost</b>	2201	21	BART Core Capacity	Supports	Supports	Supports	Supports	Supports
	2001	22	AC Transit Local Rapid Network: Capital Improvements + Service Increase	Supports	Supports	Supports	Supports	Supports
	2303	23	Caltrain Full Electrification and Blended System: High Growth	Supports	Supports	Does Not Support	Supports	Does Not Support
	2302	24	Caltrain Full Electrification and Blended System: Moderate Growth	Supports	Supports	Does Not Support	Supports	Does Not Support
	2005	25	Alameda County BRT Network + Connected Vehicle Corridors	Supports	Supports	Supports	Supports	Supports
	2410	26	VTA LRT Systemwide Grade Separation and Full Automation	Supports	Supports	Supports	Supports	Does Not Support
	2409	27	VTA LRT Systemwide Grade Separation	Supports	Supports	Supports	Supports	Supports
	2401	28	North San Jose LRT Subway	Supports	Supports	Supports	Supports	Supports
	2411	29	VTA LRT Systemwide Grade Separation, Network Expansion, and Full Automation	Supports	Supports	Supports	Supports	Supports
	2407	30	Muni Metro Southwest M-Line Subway	Supports	Supports	Supports	Supports	Supports
	2301	31	Caltrain Full Electrification and Blended System: Base Growth	Supports	Supports	Does Not Support	Supports	Does Not Support
	3001	32	Downtown San Francisco Congestion Pricing	Does Not Support	Supports	Supports	Supports	Supports
	6111	33	Integrated Transit Fare System (with Transit Capacity Expansion)	Supports	Supports	Supports	Supports	Supports
	6112	34	Integrated Transit Fare System and Seamless Transfers (with Transit Capacity Expansion)	Supports	Supports	Supports	Supports	Supports
	2209	35	Irvington BART Infill Station	Supports	Supports	Supports	Supports	Supports

Flags are based on a qualitative analysis. They are intended to draw attention to an adverse impact a project may have that may not be captured as part of other assessments.

Questions to determine Guiding Principle flags:

**Affordable:** Does the project increase travel costs for lower income residents?

**Connected:** Does the project significantly increase travel times or eliminate travel options?

**Diverse:** Does the project displace lower-income residents or divide communities (as a direct impact of project construction)?

**Healthy:** Does the project significantly increase emissions or collisions?

**Vibrant:** Does the project directly eliminate jobs?

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## Horizon/Plan Bay Area 2050: Final Project Performance Findings Attachment C: Detailed Table of Guiding Principle Flags



Total number of projects: 97; 81 projects from public agencies, 12 projects (along with 4 alternate versions) from public/NGOs that were jury finalists from the Transformative Projects process.  
Row IDs correspond to Attachment A.  
(see high-level description of methodology at the bottom of the page)

Project Type	Project ID	Row ID	Project	Affordable	Connected	Diverse	Healthy	Vibrant
<b>Optimize Existing Transit Network - Low Cost</b>	3002	36	Treasure Island Congestion Pricing	Does Not Support	Supports	Supports	Supports	Supports
	2007	37	San Francisco Southeast Waterfront Transit Improvements	Supports	Supports	Supports	Supports	Supports
	2100	38	San Pablo BRT	Supports	Supports	Supports	Supports	Supports
	2008	39	Alameda Point Transit Network Improvements	Supports	Supports	Supports	Supports	Supports
	2000	40	AC Transit Local Network: Service Increase	Supports	Supports	Supports	Supports	Supports
	2101	41	Geary BRT (Phase 2)	Supports	Supports	Supports	Supports	Supports
	2105	42	Alameda County E14th St/Mission and Fremont Blvd Multimodal Corridor	Supports	Supports	Supports	Supports	Supports
	2103	43	SamTrans El Camino Real BRT: Capital and Service Improvements	Supports	Supports	Supports	Supports	Supports
	2003	44	Muni Forward: Capital Improvements + Service Increase	Supports	Supports	Supports	Supports	Supports
	6100	45	Integrated Transit Fare System	Supports	Supports	Supports	Supports	Supports
	2004	46	Sonoma Countywide Bus: Service Increase	Supports	Supports	Supports	Supports	Supports
	2400	47	Downtown San Jose LRT Subway	Supports	Supports	Supports	Supports	Supports
	6106	48	Free Transit for Low-Income Households	Supports	Supports	Supports	Supports	Supports
	6101	49	Free Transit for All	Supports	Supports	Supports	Supports	Does Not Support
	4000	50	Oakland/Alameda Gondola Network	Supports	Supports	Supports	Supports	Does Not Support
	4001	51	Mountain View AV Network (Free Fare, Subsidies from Companies)	Supports	Supports	Supports	Supports	Does Not Support
	2403	52	Vasona LRT Extension (Phase 2)	Supports	Supports	Supports	Supports	Supports
	2412	53	SR-85 LRT (Mountain View to US101 interchange)	Supports	Supports	Supports	Supports	Supports
	2408	54	Muni Metro T-Third Extension to South San Francisco	Supports	Supports	Supports	Supports	Supports
4002	55	Contra Costa Autonomous Shuttle Program	Supports	Supports	Supports	Supports	Supports	
4003	56	Cupertino-Mountain View-San Jose Elevated Maglev Rail Loop	Supports	Supports	Supports	Supports	Does Not Support	
2402	57	San Jose Airport People Mover	Supports	Supports	Supports	Supports	Supports	
<b>Enhance Alternate Modes</b>	2600	58	WETA Ferry Service Frequency Increase	Supports	Supports	Supports	Supports	Supports
	6006	59	Enhanced Regionwide Bike Infrastructure	Supports	Supports	Supports	Supports	Supports
	2602	60	WETA Ferry Service: Berkeley - San Francisco	Supports	Supports	Supports	Supports	Supports
	2700	61	Bay Bridge West Span Bike Path	Supports	Supports	Supports	Supports	Supports
	2603	62	WETA Ferry Service: Redwood City - San Francisco - Oakland	Supports	Supports	Supports	Supports	Supports
	4004	63	Regional Hovercraft Network	Supports	Supports	Supports	Supports	Supports
	6004	64	Bay Trail Completion	Supports	Supports	Supports	Supports	Supports
6005	65	Regional Bicycle Superhighway Network	Supports	Supports	Supports	Supports	Supports	
<b>Build Local Capacity - High Cost</b>	1001	66	Southern Crossing Bridge + New San Francisco-Oakland Transbay Rail Crossing - BART (Crossing 6)	Supports	Supports	Does Not Support	Supports	Supports
	3000	67	Regional Express Lanes (MTC + VTA + ACTC + US-101)	Supports	Supports	Supports	Does Not Support	Supports
	1005	68	Mid-Bay Bridge (I-238 to I-380) (Crossing 2)	Supports	Supports	Supports	Does Not Support	Does Not Support
	1006	69	San Mateo Bridge Reconstruction and Widening (Crossing 1)	Supports	Supports	Supports	Does Not Support	Supports
<b>Build Road</b>	3101	70	I-680/SR-4 Interchange Improvements (Direct/HOV Connectors, Ramp Widening, Auxiliary Lanes)	Supports	Supports	Supports	Does Not Support	Supports

Flags are based on a qualitative analysis. They are intended to draw attention to an adverse impact a project may have that may not be captured as part of other assessments.

Questions to determine Guiding Principle flags:

**Affordable:** Does the project increase travel costs for lower income residents?

**Connected:** Does the project significantly increase travel times or eliminate travel options?

**Diverse:** Does the project displace lower-income residents or divide communities (as a direct impact of project construction)?

**Healthy:** Does the project significantly increase emissions or collisions?

**Vibrant:** Does the project directly eliminate jobs?

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## Horizon/Plan Bay Area 2050: Final Project Performance Findings Attachment C: Detailed Table of Guiding Principle Flags



Total number of projects: 97; 81 projects from public agencies, 12 projects (along with 4 alternate versions) from public/NGOs that were jury finalists from the Transformative Projects process.  
Row IDs correspond to Attachment A (see high-level description of methodology at the bottom of the page)

Project Type	Project ID	Row ID	Project	Affordable	Connected	Diverse	Healthy	Vibrant	
Build Road Capacity - Low Cost	3110	71	Union City-Fremont East-West Connector	Supports	Supports	Supports	Does Not Support	Supports	
	3102	72	SR-4 Operational Improvements	Supports	Supports	Supports	Does Not Support	Supports	
	3104	73	I-80/I-680/SR-12 Interchange + Widening (Phases 2B-7)	Supports	Supports	Supports	Does Not Support	Does Not Support	
	3103	74	SR-4 Widening (Brentwood to Discovery Bay)	Supports	Supports	Supports	Does Not Support	Supports	
	3106	75	SR-152 Realignment and Tolling	Does Not Support	Supports	Supports	Does Not Support	Supports	
	3109	76	SR-262 Widening and Interchange Improvements	Supports	Supports	Does Not Support	Does Not Support	Supports	
	3100	77	SR-239 Widening (Brentwood to Tracy including Airport Connector)	Supports	Supports	Supports	Does Not Support	Supports	
	3105	78	SR-12 Widening (I-80 to Rio Vista)	Does Not Support	Supports	Supports	Does Not Support	Supports	
	Optimize Existing Freeway Network	5000	79	Bay Area Forward (Phase 1: Freeway Ramp and Arterial Components Only)	Supports	Supports	Supports	Does Not Support	Supports
		6103	80	Demand-Based Tolling on All Highways with Means-Based Tolls	Does Not Support	Supports	Supports	Supports	Supports
6102		81	HOV Lane Network with per-mile fee for SOVs	Does Not Support	Supports	Supports	Supports	Supports	
3003		82	San Francisco Arterial HOV and Freeway HOT Lanes	Supports	Supports	Supports	Supports	Supports	
2002		83	AC Transit Transbay Network: Capital Improvements + Service Increase	Supports	Supports	Supports	Supports	Supports	
6022		84	Bus Rapid Transit (BRT) on All Bridges: Dedicated Lanes + Service/Capacity Improvements	Supports	Supports	Supports	Supports	Supports	
6020		85	Regional Express (ReX) Bus Network + Optimized Express Lane Network	Supports	Supports	Does Not Support	Supports	Supports	
5003		86	I-680 Corridor Improvements (BRT, Express Bus, Shared AVs, Gondolas)	Supports	Supports	Supports	Supports	Supports	
6104		87	Reversible Lanes on Top 10 Congested Bridges and Freeways	Supports	Supports	Supports	Does Not Support	Supports	
6003		88	I-80 Corridor Overhaul with Per-Mile Tolling	Does Not Support	Supports	Supports	Supports	Supports	
Resilience	6021	89	Bus Rapid Transit (BRT) on All Bridges: Dedicated Lanes only	Supports	Supports	Supports	Supports	Supports	
	6105	90	Timing Regulation of Freight Delivery	Supports	Does Not Support	Supports	Supports	Supports	
	7002	91	I-580/US-101/SMART Marin Resilience Project	Supports	Supports	Supports	Supports	Supports	
	7005	92	SR-237 Resilience Project (Alviso)	Supports	Supports	Supports	Supports	Supports	
	7006	93	I-880 Resilience Project (South Fremont)	Supports	Supports	Supports	Supports	Supports	
	7004	94	SR-84 Resilience Project (Dumbarton Bridge, 101 Interchange)	Supports	Supports	Supports	Supports	Supports	
	7003	95	US-101 Peninsula Resilience Project (San Antonio Rd, Poplar Ave, Millbrae Ave)	Supports	Supports	Supports	Supports	Supports	
	7001	96	VTA LRT Resilience Project (Tasman West)	Supports	Supports	Supports	Supports	Supports	
	3200	97	SR-37 Long Term Project (Tolling, Elevation, Interchanges, Widening, Express Bus)	Does Not Support	Supports	Supports	Does Not Support	Supports	

Flags are based on a qualitative analysis. They are intended to draw attention to an adverse impact a project may have that may not be captured as part of other assessments.

### Questions to determine Guiding Principle flags:

- Affordable:** Does the project increase travel costs for lower income residents?
- Connected:** Does the project significantly increase travel times or eliminate travel options?
- Diverse:** Does the project displace lower-income residents or divide communities (as a direct impact of project construction)?
- Healthy:** Does the project significantly increase emissions or collisions?
- Vibrant:** Does the project directly eliminate jobs?

## Horizon/Plan Bay Area 2050: Final Project Performance Findings Attachment D: Detailed Table of Lifecycle Benefits by Future



Total number of projects: 97; 81 projects from public agencies, 12 projects (along with 4 alternate versions) from public/NGOs that were jury finalists from the Transformative Projects process.  
Row IDs correspond to Attachment A (see high-level description of methodology at the bottom of the page)

All values in billions of 2019 dollars discounted present value

Project Type	Project ID	Row ID	Project	Future	Grand Total	Accessibility Benefits	Transit Crowding Benefits	Freeway Reliability and Vehicle Ownership Benefits	Environmental Benefits	Health Benefits	Safety Benefits
Build Core Rail	1004	1	New San Francisco-Oakland Transbay Rail Crossing - Commuter Rail (Crossing 5)	Rising Tides Falling Fortunes	\$30.7B	\$14.0B	\$7.1B	\$1.6B	\$0.3B	\$5.8B	\$1.9B
				Clean And Green	\$79.3B	\$48.4B	\$18.6B	\$2.1B	\$0.0B	\$8.6B	\$1.6B
				Back To The Future	\$98.0B	\$64.6B	\$17.8B	\$3.7B	\$0.2B	\$9.1B	\$2.6B
	1007	2	New San Francisco-Oakland Transbay Rail Crossing - BART + Commuter Rail (Crossing 7)	Rising Tides Falling Fortunes	\$47.1B	\$20.9B	\$10.6B	\$3.0B	\$0.4B	\$9.7B	\$2.4B
				Clean And Green	\$121.0B	\$68.0B	\$34.2B	\$3.6B	(\$0.1B)	\$13.1B	\$2.1B
				Back To The Future	\$114.0B	\$71.8B	\$22.0B	\$5.3B	\$0.2B	\$11.9B	\$2.7B
	1002	3	New San Francisco-Oakland Transbay Rail Crossing - BART (Crossing 3: Mission St)	Rising Tides Falling Fortunes	\$21.3B	\$6.6B	\$7.9B	\$1.9B	\$0.1B	\$4.1B	\$0.6B
				Clean And Green	\$45.4B	\$19.0B	\$18.8B	\$2.0B	\$0.0B	\$5.2B	\$0.5B
				Back To The Future	\$42.3B	\$19.9B	\$15.3B	\$2.1B	\$0.1B	\$4.4B	\$0.6B
	1003	4	New San Francisco-Oakland Transbay Rail Crossing - BART (Crossing 4: New Markets)	Rising Tides Falling Fortunes	\$21.6B	\$7.0B	\$7.2B	\$1.9B	\$0.2B	\$4.6B	\$0.7B
				Clean And Green	\$47.3B	\$19.3B	\$19.8B	\$1.8B	\$0.0B	\$6.0B	\$0.5B
				Back To The Future	\$42.7B	\$19.2B	\$15.8B	\$2.1B	\$0.1B	\$4.9B	\$0.7B
	2300	5	Caltrain Downtown Extension	Rising Tides Falling Fortunes	\$1.9B	\$1.4B	\$0.2B	\$0.0B	\$0.0B	\$0.2B	\$0.1B
				Clean And Green	\$3.4B	\$3.2B	(\$0.1B)	\$0.0B	\$0.0B	\$0.1B	\$0.1B
				Back To The Future	\$3.0B	\$2.4B	\$0.8B	(\$0.3B)	\$0.0B	\$0.0B	\$0.1B
	2205	6	BART to Silicon Valley (Phase 2)	Rising Tides Falling Fortunes	\$0.5B	\$0.3B	(\$0.3B)	\$0.2B	\$0.0B	\$0.1B	\$0.2B
				Clean And Green	\$2.3B	\$1.8B	(\$0.1B)	\$0.2B	\$0.0B	\$0.3B	\$0.2B
				Back To The Future	\$3.7B	\$3.5B	(\$1.5B)	\$1.1B	\$0.0B	\$0.4B	\$0.2B
	2306	7	Dumbarton Rail (Redwood City to Union City)	Rising Tides Falling Fortunes	(\$0.5B)	\$0.3B	(\$0.2B)	(\$0.6B)	(\$0.3B)	\$0.1B	\$0.1B
				Clean And Green	\$0.8B	\$0.9B	(\$0.3B)	\$0.3B	(\$0.3B)	\$0.1B	\$0.1B
				Back To The Future	\$1.9B	\$1.7B	\$0.3B	\$0.0B	(\$0.3B)	\$0.0B	\$0.1B
	2310	8	Megaregional Rail Network + Resilience Project (Caltrain, ACE, Valley Link, Dumbarton, Cap Cor)	Rising Tides Falling Fortunes	\$9.0B	\$5.6B	\$1.9B	\$0.7B	(\$0.7B)	\$0.9B	\$0.6B
				Clean And Green	\$26.8B	\$14.0B	\$10.7B	\$1.0B	(\$0.8B)	\$1.3B	\$0.6B
				Back To The Future	\$21.5B	\$14.6B	\$4.4B	\$1.6B	(\$0.8B)	\$1.1B	\$0.7B
2208	9	BART Gap Closure (Millbrae to Silicon Valley)	Rising Tides Falling Fortunes	\$0.5B	\$0.3B	(\$0.2B)	\$0.1B	\$0.0B	\$0.1B	\$0.1B	
			Clean And Green	\$3.8B	\$1.7B	\$1.3B	\$0.4B	\$0.0B	\$0.3B	\$0.2B	
			Back To The Future	\$5.4B	\$3.7B	\$0.1B	\$1.0B	\$0.0B	\$0.3B	\$0.3B	
6002	10	SMART to Richmond via New Richmond-San Rafael Bridge	Rising Tides Falling Fortunes	(\$0.5B)	\$0.0B	(\$0.5B)	(\$0.1B)	\$0.0B	\$0.0B	\$0.1B	
			Clean And Green	\$0.9B	\$0.8B	(\$0.1B)	\$0.0B	\$0.0B	\$0.1B	\$0.1B	
			Back To The Future	\$1.3B	\$1.4B	(\$0.8B)	\$0.5B	\$0.0B	\$0.1B	\$0.1B	
Extend Rail	2308	11	Valley Link (Dublin to San Joaquin Valley)	Rising Tides Falling Fortunes	\$0.6B	\$0.7B	(\$0.4B)	(\$0.4B)	\$0.0B	\$0.5B	\$0.2B

**Methodology Overview:** All project impacts are measured against a uniform base transportation and land use network in each future, except Resilience projects, which are measured against a baseline where that asset is out of service (hence n/a in some futures).

**Inter-regional projects:** Modeled Bay Area benefits have been multiplied by a factor to reflect the ratio of expected ridership from outside the region. Valley Link/ACE Rail benefit multiplier: 3.3; Caltrain/HSR benefit multiplier: 1.3 (the HSR multiplier is applied in Clean and Green only, the Future where HSR is completely built out).

### Description of benefits:

**Accessibility Benefits:** Represents change in accessibility benefits to all Bay Area residents as a result of the project.

**Transit Crowding Benefits:** Captures the (dis)benefits associated with increase/decrease in crowding, since people may change their travel choices or be denied boarding, or experience discomfort in a crowded vehicle.

**Freeway Reliability and Vehicle Ownership Benefits:** Reflects change in non-recurring vehicle delay on freeways, and the costs of change in vehicle ownership as a result of the project.

**Environmental Benefits:** Captures monetary value of change in GHG emissions or impact on natural lands (wetlands, pastureland, farmland) due to the project.

**Health Benefits:** Represents benefits from increased physical activity due to more walking/biking and reduction in air pollutants and noise.

**Safety Benefits:** Captures decrease in injuries and collisions due to reduced VMT as well as operational and safety improvements such as freeway ramp redesign or grade separations.

**Note:** Societal transfers such as fare/toll revenue (or loss) are excluded from both benefits and costs, following standard practice for societal benefit-cost analysis. For Project IDs 6111 and 6112, benefit values include benefits from a suite of transit capacity expansion projects; however, only the incremental benefits of the project are used for the calculation of the Benefit-Cost Ratio in Attachment A.

(Full methodology can be found here: [https://mtc.ca.gov/sites/default/files/ProjectPerformance\\_Methodology.pdf](https://mtc.ca.gov/sites/default/files/ProjectPerformance_Methodology.pdf))

Horizon/Plan Bay Area 2050: Final Project Performance Findings  
Attachment D: Detailed Table of Lifecycle Benefits by Future



Total number of projects: 97; 81 projects from public agencies, 12 projects (along with 4 alternate versions) from public/NGOs that were jury finalists from the Transformative Projects process.  
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All values in billions of 2019 dollars discounted present value

Project Type	Project ID	Row ID	Project	Future	Grand Total	Accessibility Benefits	Transit Crowding Benefits	Freeway Reliability and Vehicle Ownership Benefits	Environmental Benefits	Health Benefits	Safety Benefits
Extend Rail Network - High Cost	2308	11	Valley Link (Dublin to San Joaquin Valley)	Clean And Green	\$4.2B	\$2.0B	\$2.0B	\$0.0B	\$0.0B	\$0.2B	\$0.1B
				Back To The Future	\$3.7B	\$3.2B	(\$0.6B)	\$0.4B	\$0.0B	\$0.3B	\$0.3B
	2309	12	Altamont Corridor Vision Phase 1 (to San Joaquin Valley)	Rising Tides Falling Fortunes	\$1.2B	\$0.6B	(\$0.4B)	\$0.0B	\$0.1B	\$0.3B	\$0.4B
				Clean And Green	\$2.9B	\$2.9B	(\$2.1B)	\$0.5B	\$0.0B	\$0.3B	\$0.3B
	2206	13	BART Extension from Diridon to Cupertino	Rising Tides Falling Fortunes	\$1.1B	\$0.6B	(\$0.2B)	\$0.3B	\$0.0B	\$0.2B	\$0.1B
				Clean And Green	\$2.9B	\$1.8B	\$0.4B	\$0.0B	\$0.0B	\$0.4B	\$0.2B
	2207	14	BART Extension from Diridon to Gilroy (replacing existing Caltrain)	Back To The Future	\$5.1B	\$4.5B	(\$0.4B)	\$0.3B	\$0.0B	\$0.5B	\$0.2B
				Rising Tides Falling Fortunes	\$0.3B	\$0.3B	(\$0.1B)	\$0.1B	\$0.0B	\$0.0B	\$0.0B
	2204	15	BART on I-680 (Walnut Creek to West Dublin/Pleasanton)	Clean And Green	\$2.0B	\$0.8B	\$0.6B	\$0.4B	\$0.0B	\$0.2B	\$0.1B
				Back To The Future	\$3.0B	\$1.9B	\$0.2B	\$0.5B	\$0.0B	\$0.3B	\$0.1B
	2203	16	BART to Hercules & I-80 Bus from Vallejo to Oakland	Rising Tides Falling Fortunes	\$0.2B	\$0.2B	(\$0.1B)	\$0.2B	\$0.0B	\$0.0B	\$0.0B
				Clean And Green	\$1.6B	\$0.6B	\$1.0B	\$0.0B	\$0.0B	\$0.0B	\$0.0B
2203	16	BART to Hercules & I-80 Bus from Vallejo to Oakland	Back To The Future	\$0.2B	\$0.3B	\$0.0B	\$0.0B	\$0.0B	\$0.0B	\$0.0B	
			Rising Tides Falling Fortunes	\$0.4B	\$0.8B	(\$1.0B)	\$0.1B	\$0.1B	\$0.3B	\$0.2B	
2203	16	BART to Hercules & I-80 Bus from Vallejo to Oakland	Clean And Green	\$0.1B	\$1.4B	(\$1.6B)	(\$0.1B)	\$0.0B	\$0.2B	\$0.1B	
			Back To The Future	\$1.4B	\$1.4B	(\$0.6B)	\$0.3B	\$0.0B	\$0.1B	\$0.1B	
2203	16	BART to Hercules & I-80 Bus from Vallejo to Oakland	Rising Tides Falling Fortunes	\$0.5B	\$0.0B	\$0.0B	(\$0.2B)	\$0.0B	\$0.4B	\$0.3B	
			Clean And Green	\$1.8B	\$2.8B	(\$1.5B)	\$0.5B	\$0.0B	(\$0.2B)	\$0.2B	
2202	18	BART DMU Extension to Brentwood	Back To The Future	\$1.9B	\$2.6B	\$0.7B	(\$1.1B)	\$0.0B	(\$0.3B)	\$0.1B	
			Rising Tides Falling Fortunes	\$0.2B	\$0.1B	(\$0.1B)	(\$0.2B)	\$0.0B	\$0.1B	\$0.0B	
2202	18	BART DMU Extension to Brentwood	Clean And Green	\$0.3B	\$0.3B	(\$0.2B)	\$0.1B	\$0.0B	\$0.1B	\$0.0B	
			Back To The Future	(\$0.1B)	\$0.1B	(\$0.2B)	\$0.0B	\$0.0B	\$0.0B	\$0.0B	
2305	19	SMART to Solano (Novato to Suisun City, without sea level rise protections)	Rising Tides Falling Fortunes	(\$0.1B)	\$0.1B	(\$0.1B)	(\$0.1B)	\$0.0B	\$0.0B	\$0.0B	
			Clean And Green	\$0.2B	\$0.2B	\$0.0B	(\$0.1B)	\$0.0B	\$0.0B	\$0.1B	
2304	20	SMART Extension to Cloverdale	Back To The Future	\$0.0B	(\$0.4B)	\$0.2B	\$0.2B	\$0.0B	\$0.1B	\$0.0B	
			Rising Tides Falling Fortunes	\$0.1B	\$0.2B	(\$0.1B)	(\$0.2B)	\$0.0B	\$0.1B	\$0.0B	
2304	20	SMART Extension to Cloverdale	Clean And Green	\$0.1B	\$0.0B	\$0.1B	(\$0.1B)	\$0.0B	\$0.0B	\$0.0B	
			Back To The Future	(\$0.4B)	(\$0.4B)	\$0.2B	\$0.2B	\$0.0B	\$0.1B	\$0.0B	
2201	21	BART Core Capacity	Rising Tides Falling Fortunes	\$4.4B	\$0.7B	\$3.0B	\$0.4B	\$0.0B	\$0.2B	\$0.1B	
			Clean And Green	\$9.8B	\$1.5B	\$7.9B	\$0.0B	\$0.0B	\$0.3B	\$0.1B	

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**Inter-regional projects:** Modeled Bay Area benefits have been multiplied by a factor to reflect the ratio of expected ridership from outside the region. Valley Link/ACE Rail benefit multiplier: 3.3; Caltrain/HSR benefit multiplier: 1.3 (the HSR multiplier is applied in Clean and Green only, the Future where HSR is completely built out).

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**Note:** Societal transfers such as fare/toll revenue (or loss) are excluded from both benefits and costs, following standard practice for societal benefit-cost analyses. For Project IDs G111 and G112, benefit values include benefits from a suite of transit capacity expansion projects; however, only the incremental benefits of the project are used for the calculation of the Benefit-Cost Ratio in Attachment A. (Full methodology can be found here: [https://mtc.ca.gov/sites/default/files/ProjectPerformance\\_Methodology.pdf](https://mtc.ca.gov/sites/default/files/ProjectPerformance_Methodology.pdf))

Horizon/Plan Bay Area 2050: Final Project Performance Findings  
Attachment D: Detailed Table of Lifecycle Benefits by Future



Total number of projects: 97; 81 projects from public agencies, 12 projects (along with 4 alternate versions) from public/NGOs that were jury finalists from the Transformative Projects process.  
Row IDs correspond to Attachment A.  
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All values in billions of 2019 dollars discounted present value

Project Type	Project ID	Row ID	Project	Future	Grand Total	Accessibility Benefits	Transit Crowding Benefits	Freeway Reliability and Vehicle Ownership Benefits	Environmental Benefits	Health Benefits	Safety Benefits
Optimize Existing Transit Network - High Cost	2201	21	BART Core Capacity	Back To The Future	\$10.2B	\$2.8B	\$6.6B	\$0.6B	\$0.0B	\$0.2B	\$0.1B
				Rising Tides Falling Fortunes	\$3.5B	\$0.6B	\$0.0B	\$2.1B	\$0.1B	\$0.3B	\$0.4B
2201	22	AC Transit Local Rapid Network: Capital Improvements + Service Increase	Clean And Green	\$3.9B	\$1.3B	(\$0.6B)	\$2.4B	\$0.0B	\$0.4B	\$0.4B	
			Back To The Future	\$5.3B	\$2.7B	(\$1.3B)	\$2.8B	\$0.0B	\$0.4B	\$0.7B	
2303	23	Caltrain Full Electrification and Blended System: High Growth	Rising Tides Falling Fortunes	\$8.1B	\$4.5B	\$1.7B	\$0.4B	\$0.1B	\$0.5B	\$1.0B	
			Clean And Green	\$30.3B	\$15.5B	\$11.7B	\$0.7B	\$0.0B	\$1.1B	\$1.3B	
2302	24	Caltrain Full Electrification and Blended System: Moderate Growth	Back To The Future	\$16.0B	\$9.8B	\$3.5B	\$1.0B	\$0.0B	\$0.8B	\$0.9B	
			Rising Tides Falling Fortunes	\$6.8B	\$3.6B	\$1.7B	\$0.3B	\$0.1B	\$0.3B	\$0.8B	
2302	24	Caltrain Full Electrification and Blended System: Moderate Growth	Clean And Green	\$22.9B	\$12.2B	\$8.5B	\$0.4B	\$0.0B	\$0.8B	\$1.0B	
			Back To The Future	\$12.7B	\$7.8B	\$2.7B	\$0.8B	\$0.0B	\$0.5B	\$0.8B	
2005	25	Alameda County BRT Network + Connected Vehicle Corridors	Rising Tides Falling Fortunes	\$1.0B	\$0.4B	(\$0.2B)	\$0.3B	\$0.0B	\$0.3B	\$0.1B	
			Clean And Green	\$1.5B	\$0.4B	(\$0.2B)	\$1.0B	\$0.0B	\$0.2B	\$0.1B	
2410	26	VTA LRT Systemwide Grade Separation and Full Automation	Back To The Future	\$2.6B	\$1.6B	\$0.1B	\$0.7B	\$0.0B	\$0.1B	\$0.2B	
			Rising Tides Falling Fortunes	\$1.9B	\$0.6B	(\$0.6B)	\$0.9B	\$0.0B	\$0.4B	\$0.6B	
2409	27	VTA LRT Systemwide Grade Separation	Clean And Green	\$5.7B	\$3.4B	(\$0.4B)	\$1.3B	\$0.0B	\$0.8B	\$0.7B	
			Back To The Future	\$10.2B	\$6.2B	(\$0.1B)	\$2.3B	\$0.0B	\$1.0B	\$0.7B	
2409	27	VTA LRT Systemwide Grade Separation	Rising Tides Falling Fortunes	\$0.7B	(\$0.1B)	(\$0.2B)	\$0.4B	\$0.0B	\$0.2B	\$0.4B	
			Clean And Green	\$2.6B	\$1.1B	\$0.5B	\$0.3B	\$0.0B	\$0.3B	\$0.4B	
2401	28	North San Jose LRT Subway	Back To The Future	\$5.6B	\$2.9B	\$1.1B	\$0.7B	\$0.0B	\$0.3B	\$0.5B	
			Rising Tides Falling Fortunes	\$0.0B	(\$0.1B)	(\$0.2B)	\$0.3B	\$0.0B	\$0.0B	\$0.1B	
2401	28	North San Jose LRT Subway	Clean And Green	\$0.7B	(\$0.4B)	\$0.7B	\$0.1B	\$0.0B	\$0.2B	\$0.2B	
			Back To The Future	\$2.4B	\$1.2B	\$0.2B	\$0.6B	\$0.0B	\$0.3B	\$0.2B	
2411	29	VTA LRT Systemwide Grade Separation, Network Expansion, and Full Automation	Rising Tides Falling Fortunes	\$4.2B	\$1.9B	(\$0.9B)	\$1.1B	\$0.1B	\$1.1B	\$0.9B	
			Clean And Green	\$9.1B	\$5.6B	(\$1.9B)	\$2.4B	\$0.0B	\$2.1B	\$0.8B	
2407	30	Muni Metro Southwest M-Line Subway	Back To The Future	\$16.0B	\$10.3B	(\$0.9B)	\$3.0B	\$0.1B	\$2.5B	\$1.1B	
			Rising Tides Falling Fortunes	\$0.4B	(\$0.2B)	\$0.4B	\$0.1B	\$0.0B	\$0.0B	\$0.0B	
2301	31	Caltrain Full Electrification and Blended System: Base Growth	Clean And Green	\$1.4B	(\$0.3B)	\$1.7B	(\$0.1B)	\$0.0B	\$0.0B	\$0.0B	
			Back To The Future	\$2.0B	\$0.2B	\$1.2B	\$0.4B	\$0.0B	\$0.2B	\$0.0B	
2301	31	Caltrain Full Electrification and Blended System: Base Growth	Rising Tides Falling Fortunes	\$3.1B	\$1.1B	\$1.2B	\$0.1B	\$0.0B	\$0.1B	\$0.6B	
			Clean And Green	\$4.9B	\$3.5B	\$0.6B	\$0.0B	\$0.0B	\$0.1B	\$0.8B	
2301	31	Caltrain Full Electrification and Blended System: Base Growth	Back To The Future	\$4.4B	\$2.4B	\$1.2B	\$0.2B	\$0.0B	\$0.0B	\$0.6B	

**Methodology Overview:** All project impacts are measured against a uniform base transportation and land use network in each future, except Resilience projects, which are measured against a baseline where that asset is out of service (hence n/a in some futures).

**Inter-regional projects:** Modeled Bay Area benefits have been multiplied by a factor to reflect the ratio of expected ridership from outside the region. Valley Link/ACE Rail benefit multiplier: 3.3; Caltrain/HSR benefit multiplier: 1.3 (the HSR multiplier is applied in Clean and Green only, the Future where HSR is completely built out).

**Description of benefits:**

**Accessibility Benefits:** Represents change in accessibility benefits to all Bay Area residents as a result of the project.

**Transit Crowding Benefits:** Captures the (dis)benefits associated with increase/decrease in crowding, since people may change their travel choices or be denied boarding, or experience discomfort in a crowded vehicle.

**Freeway Reliability and Vehicle Ownership Benefits:** Reflects change in non-recurring vehicle delay on freeways, and the costs of change in vehicle ownership as a result of the project.

**Environmental Benefits:** Captures monetary value of change in GHG emissions or impact on natural lands (wetlands, pastureland, farmland) due to the project.

**Health Benefits:** Represents benefits from increased physical activity due to more walking/biking and reduction in air pollutants and noise.

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## Horizon/Plan Bay Area 2050: Final Project Performance Findings Attachment D: Detailed Table of Lifecycle Benefits by Future



Total number of projects: 97; 81 projects from public agencies, 12 projects (along with 4 alternate versions) from public/NGOs that were jury finalists from the Transformative Projects process.  
Row IDs correspond to Attachment A.  
(see high-level description of methodology at the bottom of the page)

All values in billions of 2019 dollars discounted present value

Project Type	Project ID	Row ID	Project	Future	Grand Total	Accessibility Benefits	Transit Crowding Benefits	Freeway Reliability and Vehicle Ownership Benefits	Environmental Benefits	Health Benefits	Safety Benefits
Optimize Existing Transit Network - Low Cost	3001	32	Downtown San Francisco Congestion Pricing	Rising Tides Falling Fortunes	\$6.2B	\$5.4B	(\$0.6B)	\$0.7B	\$0.1B	\$0.3B	\$0.1B
				Clean And Green	\$5.6B	\$5.4B	(\$0.6B)	\$0.3B	\$0.0B	\$0.3B	\$0.1B
				Back To The Future	\$11.3B	\$9.2B	\$0.2B	\$1.2B	\$0.1B	\$0.2B	\$0.4B
	6111	33	Integrated Transit Fare System (with Transit Capacity Expansion)	Rising Tides Falling Fortunes	\$44.9B	\$20.4B	\$16.2B	\$3.7B	\$0.0B	\$2.4B	\$2.2B
				Clean And Green	\$44.1B	\$23.5B	\$11.4B	\$4.8B	\$0.1B	\$1.8B	\$2.5B
				Back To The Future	\$22.0B	\$8.3B	\$5.9B	\$3.3B	\$0.3B	\$1.7B	\$2.4B
	6112	34	Integrated Transit Fare System and Seamless Transfers (with Transit Capacity Expansion)	Rising Tides Falling Fortunes	\$46.2B	\$21.8B	\$15.5B	\$4.0B	\$0.0B	\$2.6B	\$2.3B
				Clean And Green	\$45.9B	\$25.0B	\$11.1B	\$5.0B	\$0.1B	\$2.0B	\$2.5B
				Back To The Future	\$0.3B	\$0.1B	\$0.2B	\$0.0B	\$0.0B	(\$0.1B)	\$0.1B
	2209	35	Irvington BART Infill Station	Rising Tides Falling Fortunes	\$0.2B	\$0.0B	(\$0.9B)	\$0.1B	\$0.0B	\$0.1B	\$0.1B
				Clean And Green	\$2.1B	\$2.1B	\$0.2B	(\$0.2B)	\$0.0B	\$0.0B	\$0.1B
				Back To The Future	\$0.7B	\$0.2B	\$0.3B	\$0.2B	\$0.0B	\$0.0B	\$0.0B
3002	36	Treasure Island Congestion Pricing	Rising Tides Falling Fortunes	\$0.9B	\$0.4B	\$0.4B	(\$0.1B)	\$0.0B	\$0.1B	\$0.0B	
			Clean And Green	\$1.4B	\$0.5B	\$0.4B	\$0.4B	\$0.0B	\$0.1B	\$0.0B	
			Back To The Future	\$1.0B	\$0.4B	\$0.5B	\$0.2B	\$0.0B	(\$0.1B)	\$0.0B	
2007	37	San Francisco Southeast Waterfront Transit Improvements	Rising Tides Falling Fortunes	\$1.6B	\$0.2B	\$1.4B	\$0.0B	\$0.0B	(\$0.1B)	\$0.0B	
			Clean And Green	\$2.2B	\$0.8B	\$1.1B	\$0.4B	\$0.0B	(\$0.1B)	\$0.0B	
			Back To The Future	\$0.6B	\$0.2B	(\$0.1B)	\$0.0B	\$0.0B	\$0.2B	\$0.3B	
2100	38	San Pablo BRT	Rising Tides Falling Fortunes	\$1.2B	\$0.2B	\$0.5B	\$0.2B	\$0.0B	\$0.1B	\$0.3B	
			Clean And Green	\$1.6B	\$0.6B	\$0.2B	\$0.3B	\$0.0B	\$0.2B	\$0.3B	
			Back To The Future	\$0.4B	\$0.2B	\$0.1B	\$0.0B	\$0.0B	\$0.1B	\$0.0B	
2008	39	Alameda Point Transit Network Improvements	Rising Tides Falling Fortunes	\$1.4B	\$0.3B	\$1.0B	\$0.0B	\$0.0B	\$0.0B	\$0.0B	
			Clean And Green	\$1.8B	\$1.5B	\$0.0B	\$0.3B	\$0.0B	\$0.1B	\$0.0B	
			Back To The Future	\$3.2B	\$0.5B	\$0.5B	\$1.6B	\$0.0B	\$0.3B	\$0.3B	
2000	40	AC Transit Local Network: Service Increase	Rising Tides Falling Fortunes	\$5.9B	\$1.7B	\$1.9B	\$1.7B	\$0.0B	\$0.3B	\$0.2B	
			Clean And Green	\$5.9B	\$3.5B	(\$0.2B)	\$1.9B	\$0.0B	\$0.3B	\$0.2B	
			Back To The Future	\$0.9B	\$0.1B	\$0.5B	(\$0.1B)	\$0.0B	\$0.1B	\$0.3B	
2101	41	Geary BRT (Phase 2)	Rising Tides Falling Fortunes	\$1.8B	\$0.7B	\$0.4B	\$0.4B	\$0.0B	\$0.1B	\$0.1B	
			Clean And Green	\$1.8B	\$0.7B	\$0.4B	\$0.4B	\$0.0B	\$0.1B	\$0.1B	
			Back To The Future	\$0.6B	\$0.3B	(\$0.3B)	\$0.2B	\$0.0B	\$0.2B	\$0.2B	
2105	42	Alameda County E14th St/Mission and Fremont Blvd Multimodal Corridor	Rising Tides Falling Fortunes	\$1.1B	\$0.3B	\$0.0B	\$0.5B	\$0.0B	\$0.1B	\$0.1B	
			Clean And Green	\$0.8B	\$0.4B	(\$0.2B)	\$0.3B	\$0.0B	\$0.1B	\$0.2B	
			Back To The Future	\$0.6B	(\$0.1B)	\$0.4B	\$0.1B	\$0.0B	\$0.1B	\$0.1B	
2103	43	SamTrans El Camino Real BRT: Capital and Service Improvements	Rising Tides Falling Fortunes	\$0.7B	\$0.4B	\$0.0B	\$0.2B	\$0.0B	\$0.0B	\$0.1B	
			Clean And Green	\$1.0B	\$0.5B	\$0.8B	(\$0.3B)	\$0.0B	\$0.0B	\$0.0B	
			Back To The Future	\$2.0B	\$0.6B	\$0.8B	\$0.1B	\$0.0B	(\$0.1B)	\$0.6B	
2003	44	Muni Forward: Capital Improvements + Service Increase	Rising Tides Falling Fortunes	\$4.4B	\$0.7B	\$2.8B	\$0.5B	\$0.0B	(\$0.1B)	\$0.6B	
			Clean And Green	\$3.4B	\$0.6B	\$2.1B	\$0.3B	\$0.0B	(\$0.1B)	\$0.6B	
			Back To The Future	\$0.7B	\$0.8B	(\$1.5B)	\$0.5B	\$0.1B	\$0.4B	\$0.4B	
6100	45	Integrated Transit Fare System	Rising Tides Falling Fortunes	(\$1.4B)	\$3.0B	(\$5.9B)	\$0.5B	\$0.0B	\$0.6B	\$0.4B	
			Clean And Green	\$1.6B	\$2.6B	(\$2.4B)	\$0.8B	\$0.0B	\$0.2B	\$0.3B	
			Back To The Future	\$0.2B	\$0.0B	\$0.0B	\$0.0B	\$0.0B	\$0.1B	\$0.1B	
2004	46	Sonoma Countywide Bus: Service Increase	Rising Tides Falling Fortunes	\$0.2B	\$0.0B	\$0.0B	\$0.0B	\$0.0B	\$0.0B	\$0.1B	
			Clean And Green	\$1.3B	\$0.7B	\$0.2B	\$0.4B	\$0.0B	\$0.0B	\$0.0B	
			Back To The Future	\$0.2B	\$0.0B	(\$0.2B)	\$0.4B	\$0.0B	\$0.0B	\$0.0B	
2400	47	Downtown San Jose LRT Subway	Rising Tides Falling Fortunes	\$0.3B	\$0.2B	(\$0.2B)	\$0.2B	\$0.0B	\$0.1B	\$0.0B	
			Clean And Green	\$2.5B	\$1.5B	\$0.1B	\$0.6B	\$0.0B	\$0.2B	\$0.1B	
			Back To The Future	(\$17.3B)	(\$11.2B)	(\$13.8B)	\$1.1B	\$0.4B	\$3.8B	\$2.3B	
6106	48	Free Transit for Low-Income Households	Rising Tides Falling Fortunes	(\$23.9B)	\$2.5B	(\$31.1B)	\$0.8B	\$0.0B	\$2.8B	\$1.2B	
			Clean And Green	(\$15.1B)	\$0.4B	(\$20.1B)	\$0.7B	\$0.1B	\$2.6B	\$1.3B	
			Back To The Future	(\$50.3B)	(\$34.9B)	(\$33.5B)	\$3.9B	\$1.1B	\$7.6B	\$5.5B	
6101	49	Free Transit for All	Rising Tides Falling Fortunes	(\$65.7B)	(\$12.4B)	(\$75.9B)	\$3.1B	(\$0.1B)	\$9.3B	\$4.2B	
			Clean And Green	(\$113.2B)	(\$39.9B)	(\$89.9B)	\$3.1B	(\$0.1B)	\$9.3B	\$4.2B	
			Back To The Future	\$0.8B	\$0.5B	(\$0.1B)	\$0.1B	\$0.0B	\$0.2B	\$0.1B	
Build Local Transit	4000	50	Oakland/Alameda Gondola Network	Rising Tides Falling Fortunes	\$0.3B	\$0.1B	(\$0.1B)	\$0.0B	\$0.0B	\$0.3B	\$0.1B
				Clean And Green	\$2.4B	\$2.0B	(\$0.6B)	\$0.5B	\$0.0B	\$0.4B	\$0.1B
				Back To The Future	\$0.4B	\$0.1B	(\$0.1B)	\$0.0B	\$0.0B	\$0.2B	\$0.1B
4001	51	Mountain View AV Network (Free Fare, Subsidies from Companies)	Rising Tides Falling Fortunes	\$1.2B	\$0.8B	(\$0.1B)	\$0.4B	\$0.0B	\$0.0B	\$0.0B	
			Clean And Green	\$1.5B	\$0.8B	\$0.2B	\$0.3B	\$0.0B	\$0.1B	\$0.1B	
			Back To The Future	\$0.2B	\$0.1B	(\$0.1B)	\$0.4B	\$0.0B	\$0.0B	\$0.0B	
2403	52	Vasona LRT Extension (Phase 2)	Rising Tides Falling Fortunes	\$0.1B	\$0.2B	\$0.0B	(\$0.1B)	\$0.0B	\$0.0B	\$0.0B	
			Clean And Green								
			Back To The Future								

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				Back To The Future	\$0.8B	\$0.4B	(\$0.2B)	\$0.3B	\$0.0B	\$0.1B	\$0.2B
				Rising Tides Falling Fortunes	\$0.6B	(\$0.1B)	\$0.4B	\$0.1B	\$0.0B	\$0.1B	\$0.1B
	2103	43	SamTrans El Camino Real BRT: Capital and Service Improvements	Rising Tides Falling Fortunes	\$0.7B	\$0.4B	\$0.0B	\$0.2B	\$0.0B	\$0.0B	\$0.1B
				Clean And Green	\$1.0B	\$0.5B	\$0.8B	(\$0.3B)	\$0.0B	\$0.0B	\$0.0B
				Back To The Future	\$2.0B	\$0.6B	\$0.8B	\$0.1B	\$0.0B	(\$0.1B)	\$0.6B
	2003	44	Muni Forward: Capital Improvements + Service Increase	Rising Tides Falling Fortunes	\$4.4B	\$0.7B	\$2.8B	\$0.5B	\$0.0B	(\$0.1B)	\$0.6B
				Clean And Green	\$3.4B	\$0.6B	\$2.1B	\$0.3B	\$0.0B	(\$0.1B)	\$0.6B
				Back To The Future	\$0.7B	\$0.8B	(\$1.5B)	\$0.5B	\$0.1B	\$0.4B	\$0.4B
	6100	45	Integrated Transit Fare System	Rising Tides Falling Fortunes	(\$1.4B)	\$3.0B	(\$5.9B)	\$0.5B	\$0.0B	\$0.6B	\$0.4B
				Clean And Green	\$1.6B	\$2.6B	(\$2.4B)	\$0.8B	\$0.0B	\$0.2B	\$0.3B
				Back To The Future	\$0.2B	\$0.0B	\$0.0B	\$0.0B	\$0.0B	\$0.1B	\$0.1B
2004	46	Sonoma Countywide Bus: Service Increase	Rising Tides Falling Fortunes	\$0.2B	\$0.0B	\$0.0B	\$0.0B	\$0.0B	\$0.0B	\$0.1B	
			Clean And Green	\$1.3B	\$0.7B	\$0.2B	\$0.4B	\$0.0B	\$0.0B	\$0.0B	
			Back To The Future	\$0.2B	\$0.0B	(\$0.2B)	\$0.4B	\$0.0B	\$0.0B	\$0.0B	
2400	47	Downtown San Jose LRT Subway	Rising Tides Falling Fortunes	\$0.3B	\$0.2B	(\$0.2B)	\$0.2B	\$0.0B	\$0.1B	\$0.0B	
			Clean And Green	\$2.5B	\$1.5B	\$0.1B	\$0.6B	\$0.0B	\$0.2B	\$0.1B	
			Back To The Future	(\$17.3B)	(\$11.2B)	(\$13.8B)	\$1.1B	\$0.4B	\$3.8B	\$2.3B	
6106	48	Free Transit for Low-Income Households	Rising Tides Falling Fortunes	(\$23.9B)	\$2.5B	(\$31.1B)	\$0.8B	\$0.0B	\$2.8B	\$1.2B	
			Clean And Green	(\$15.1B)	\$0.4B	(\$20.1B)	\$0.7B	\$0.1B	\$2.6B	\$1.3B	
			Back To The Future	(\$50.3B)	(\$34.9B)	(\$33.5B)	\$3.9B	\$1.1B	\$7.6B	\$5.5B	
6101	49	Free Transit for All	Rising Tides Falling Fortunes	(\$65.7B)	(\$12.4B)	(\$75.9B)	\$3.1B	(\$0.1B)	\$9.3B	\$4.2B	
			Clean And Green	(\$113.2B)	(\$39.9B)	(\$89.9B)	\$3.1B	(\$0.1B)	\$9.3B	\$4.2B	
			Back To The Future	\$0.8B	\$0.5B	(\$0.1B)	\$0.1B	\$0.0B	\$0.2B	\$0.1B	
Build Local Transit	4000	50	Oakland/Alameda Gondola Network	Rising Tides Falling Fortunes	\$0.3B	\$0.1B	(\$0.1B)	\$0.0B	\$0.0B	\$0.3B	\$0.1B
				Clean And Green	\$2.4B	\$2.0B	(\$0.6B)	\$0.5B	\$0.0B	\$0.4B	\$0.1B
				Back To The Future	\$0.4B	\$0.1B	(\$0.1B)	\$0.0B	\$0.0B	\$0.2B	\$0.1B
4001	51	Mountain View AV Network (Free Fare, Subsidies from Companies)	Rising Tides Falling Fortunes	\$1.2B	\$0.8B	(\$0.1B)	\$0.4B	\$0.0B	\$0.0B	\$0.0B	
			Clean And Green	\$1.5B	\$0.8B	\$0.2B	\$0.3B	\$0.0B	\$0.1B	\$0.1B	
			Back To The Future	\$0.2B	\$0.1B	(\$0.1B)	\$0.4B	\$0.0B	\$0.0B	\$0.0B	
2403	52	Vasona LRT Extension (Phase 2)	Rising Tides Falling Fortunes	\$0.1B	\$0.2B	\$0.0B	(\$0.1B)	\$0.0B	\$0.0B	\$0.0B	
			Clean And Green								
			Back To The Future								

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**Freeway Reliability and Vehicle Ownership Benefits:** Reflects change in non-recurring vehicle delay on freeways, and the costs of change in vehicle ownership as a result of the project.

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**Note:** Societal transfers such as fare/toll revenue (or loss) are excluded from both benefits and costs, following standard practice for societal benefit-cost analyses. For Project IDs 6111 and 6112, benefit values include benefits from a suite of transit capacity expansion projects; however, only the incremental benefits of the project are used for the calculation of the Benefit-Cost Ratio in Attachment A. (Full methodology can be found here: [https://mtc.ca.gov/sites/default/files/ProjectPerformance\\_Methodology.pdf](https://mtc.ca.gov/sites/default/files/ProjectPerformance_Methodology.pdf))

## Horizon/Plan Bay Area 2050: Final Project Performance Findings Attachment D: Detailed Table of Lifecycle Benefits by Future



Total number of projects: 97; 81 projects from public agencies, 12 projects (along with 4 alternate versions) from public/NGOs that were jury finalists from the Transformative Projects process.  
Row IDs correspond to Attachment A.  
(see high-level description of methodology at the bottom of the page)

All values in billions of 2019 dollars discounted present value

Project Type	Project ID	Row ID	Project	Future	Grand Total	Accessibility Benefits	Transit Crowding Benefits	Freeway Reliability and Vehicle Ownership Benefits	Environmental Benefits	Health Benefits	Safety Benefits
<b>Build Local Transit</b>	2403	52	Vasona LRT Extension (Phase 2)	Back To The Future	\$0.4B	\$0.4B	(\$0.4B)	\$0.4B	\$0.0B	\$0.0B	\$0.0B
	2412	53	SR-85 LRT (Mountain View to US101 Interchange)	Rising Tides Falling Fortunes	\$1.0B	\$0.5B	\$0.0B	\$0.2B	\$0.0B	\$0.3B	\$0.1B
				Clean And Green	\$2.5B	\$0.8B	\$1.1B	\$0.2B	\$0.0B	\$0.3B	\$0.1B
	2408	54	Muni Metro T-Third Extension to South San Francisco	Back To The Future	\$2.3B	\$1.8B	\$0.0B	\$0.3B	\$0.0B	\$0.2B	\$0.1B
				Rising Tides Falling Fortunes	(\$0.2B)	\$0.0B	(\$0.4B)	\$0.2B	\$0.0B	\$0.0B	\$0.0B
				Clean And Green	\$0.6B	\$0.0B	\$0.5B	\$0.0B	\$0.0B	\$0.1B	\$0.1B
	4002	55	Contra Costa Autonomous Shuttle Program	Back To The Future	\$1.7B	\$1.0B	\$0.2B	\$0.4B	\$0.0B	\$0.0B	\$0.1B
				Rising Tides Falling Fortunes	\$0.7B	\$0.1B	(\$0.1B)	\$0.4B	\$0.0B	\$0.2B	\$0.1B
				Clean And Green	\$1.2B	\$0.1B	\$0.0B	\$0.6B	\$0.0B	\$0.3B	\$0.1B
	4003	56	Cupertino-Mountain View-San Jose Elevated Maglev Rail Loop	Back To The Future	\$0.9B	\$0.4B	(\$0.1B)	\$0.2B	\$0.0B	\$0.3B	\$0.1B
				Rising Tides Falling Fortunes	\$0.4B	\$0.5B	(\$0.2B)	\$0.0B	\$0.0B	\$0.0B	\$0.0B
				Clean And Green	\$2.5B	\$0.9B	\$1.2B	\$0.3B	\$0.0B	\$0.1B	\$0.0B
	2402	57	San Jose Airport People Mover	Back To The Future	\$2.7B	\$0.9B	\$1.3B	\$0.2B	\$0.0B	\$0.2B	\$0.0B
				Rising Tides Falling Fortunes	\$0.4B	\$0.1B	\$0.0B	\$0.2B	\$0.0B	\$0.0B	\$0.1B
				Clean And Green	\$0.6B	\$0.1B	\$0.4B	\$0.2B	\$0.0B	(\$0.1B)	\$0.0B
<b>Enhance Alternate Modes</b>	2600	58	WETA Ferry Service Frequency Increase	Back To The Future	(\$0.7B)	(\$0.8B)	\$0.0B	\$0.1B	\$0.0B	\$0.1B	\$0.0B
				Rising Tides Falling Fortunes	\$0.7B	\$0.1B	\$0.4B	\$0.2B	\$0.0B	\$0.0B	\$0.0B
				Clean And Green	\$2.4B	\$0.5B	\$1.5B	\$0.2B	\$0.0B	\$0.2B	\$0.1B
	6006	59	Enhanced Regionwide Bike Infrastructure	Back To The Future	\$0.9B	\$0.4B	\$0.5B	\$0.1B	\$0.0B	\$0.0B	(\$0.1B)
				Rising Tides Falling Fortunes	\$13.7B	\$9.8B	\$1.0B	\$0.0B	\$0.2B	\$1.2B	\$1.4B
				Clean And Green	\$36.1B	\$28.5B	\$4.3B	\$0.6B	\$0.0B	\$1.0B	\$1.2B
	2602	60	WETA Ferry Service: Berkeley - San Francisco	Back To The Future	\$40.0B	\$31.1B	\$4.0B	\$1.3B	\$0.1B	\$1.8B	\$1.7B
				Rising Tides Falling Fortunes	(\$0.2B)	(\$0.1B)	\$0.0B	(\$0.5B)	\$0.0B	\$0.1B	\$0.1B
				Clean And Green	\$0.3B	(\$0.1B)	\$0.4B	(\$0.1B)	\$0.0B	\$0.0B	\$0.0B
	2700	61	Bay Bridge West Span Bike Path	Back To The Future	\$0.3B	(\$0.7B)	\$0.9B	\$0.1B	\$0.0B	(\$0.1B)	\$0.1B
				Rising Tides Falling Fortunes	(\$0.5B)	(\$0.2B)	\$0.0B	(\$0.2B)	\$0.0B	\$0.0B	\$0.0B
				Clean And Green	\$1.1B	\$0.7B	\$0.2B	\$0.1B	\$0.0B	\$0.0B	\$0.0B
	2603	62	WETA Ferry Service: Redwood City - San Francisco - Oakland	Back To The Future	\$0.4B	\$0.1B	(\$0.2B)	\$0.4B	\$0.0B	\$0.1B	\$0.0B
				Rising Tides Falling Fortunes	\$0.2B	\$0.0B	\$0.1B	(\$0.2B)	\$0.0B	\$0.2B	\$0.1B
				Clean And Green	\$0.2B	\$0.2B	(\$0.1B)	\$0.0B	\$0.0B	\$0.0B	\$0.0B
			Back To The Future	(\$0.7B)	(\$0.5B)	(\$0.2B)	\$0.0B	\$0.0B	\$0.0B	\$0.0B	

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## Horizon/Plan Bay Area 2050: Final Project Performance Findings Attachment D: Detailed Table of Lifecycle Benefits by Future



Total number of projects: 97; 81 projects from public agencies, 12 projects (along with 4 alternate versions) from public/NGOs that were jury finalists from the Transformative Projects process.  
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(see high-level description of methodology at the bottom of the page)

All values in billions of 2019 dollars discounted present value

Project Type	Project ID	Row ID	Project	Future	Grand Total	Accessibility Benefits	Transit Crowding Benefits	Freeway Reliability and Vehicle Ownership Benefits	Environmental Benefits	Health Benefits	Safety Benefits
<b>Enhance Alternate Modes</b>	4004	63	Regional Hovercraft Network	Rising Tides Falling Fortunes	\$0.4B	\$0.1B	\$0.3B	(\$0.2B)	\$0.0B	\$0.2B	\$0.1B
				Clean And Green	\$1.5B	\$0.3B	\$0.9B	\$0.2B	\$0.0B	\$0.0B	\$0.0B
				Back To The Future	\$0.9B	\$0.0B	\$0.5B	\$0.2B	\$0.0B	\$0.1B	\$0.1B
<b>Build Road Capacity - High Cost</b>	1001	66	Southern Crossing Bridge + New San Francisco-Oakland Transit Rail Crossing - BART (Crossing 6)	Rising Tides Falling Fortunes	\$26.3B	\$11.9B	\$7.6B	\$1.2B	\$0.1B	\$5.0B	\$0.5B
				Clean And Green	\$60.3B	\$30.4B	\$16.6B	\$1.7B	(\$0.2B)	\$9.2B	\$0.5B
				Back To The Future	\$73.2B	\$47.8B	\$17.7B	\$1.6B	\$0.1B	\$5.2B	\$0.8B
	2000	67	Regional Express Lanes (MTC + VTA + ACTC + US-101 Crossing 5)	Rising Tides Falling Fortunes	\$6.6B	\$6.4B	(\$0.5B)	\$1.4B	(\$0.2B)	(\$0.2B)	(\$0.3B)
				Clean And Green	\$7.0B	\$5.0B	\$0.7B	\$1.2B	\$0.0B	(\$0.1B)	\$0.3B
				Back To The Future	\$18.8B	\$21.8B	\$0.7B	\$0.8B	(\$0.5B)	(\$0.9B)	(\$3.2B)
	1005	68	Mid-Bay Bridge (I-238 to I-380) (Crossing 2)	Rising Tides Falling Fortunes	\$4.3B	\$4.3B	\$0.2B	\$0.3B	(\$0.1B)	(\$0.2B)	(\$0.3B)
				Clean And Green	\$7.9B	\$7.1B	\$1.3B	(\$0.2B)	(\$0.1B)	(\$0.1B)	(\$0.2B)
				Back To The Future	\$21.1B	\$21.3B	\$1.6B	(\$0.3B)	\$0.0B	(\$1.4B)	(\$0.2B)
	1006	69	San Mateo Bridge Reconstruction and Widening (Crossing 3)	Rising Tides Falling Fortunes	\$0.1B	(\$0.1B)	\$0.1B	\$0.0B	\$0.0B	\$0.1B	\$0.0B
				Clean And Green	(\$0.9B)	(\$1.1B)	\$0.3B	\$0.2B	\$0.0B	(\$0.1B)	\$0.0B
				Back To The Future	\$2.4B	\$2.4B	\$0.6B	\$0.1B	\$0.0B	(\$0.4B)	(\$0.1B)
<b>Build Road Capacity - Low Cost</b>	3101	70	I-680/SR-4 Interchange Improvements (Direct/HOV Connectors, Ramp Widening, Auxiliary Lanes)	Rising Tides Falling Fortunes	(\$0.1B)	\$0.1B	\$0.1B	(\$0.1B)	\$0.0B	(\$0.1B)	\$0.0B
				Clean And Green	\$1.0B	\$0.8B	\$0.1B	\$0.0B	\$0.0B	\$0.0B	\$0.1B
				Back To The Future	\$1.4B	\$1.2B	\$0.0B	\$0.2B	\$0.0B	\$0.0B	\$0.0B
	3110	71	Union City-Fremont East-West Connector	Rising Tides Falling Fortunes	\$0.3B	\$0.1B	\$0.1B	\$0.1B	\$0.0B	\$0.0B	\$0.1B
				Clean And Green	\$0.5B	\$0.2B	\$0.1B	\$0.2B	\$0.0B	\$0.0B	\$0.0B
				Back To The Future	\$1.2B	\$1.1B	\$0.2B	(\$0.1B)	\$0.0B	\$0.0B	\$0.0B
	3102	72	SR-4 Operational Improvements	Rising Tides Falling Fortunes	\$0.0B	\$0.1B	(\$0.1B)	(\$0.1B)	\$0.0B	\$0.0B	\$0.1B
				Clean And Green	\$0.0B	\$0.0B	\$0.0B	\$0.1B	\$0.0B	\$0.0B	\$0.2B
				Back To The Future	\$1.1B	\$0.8B	(\$0.2B)	\$0.2B	\$0.0B	\$0.1B	\$0.1B
	3104	73	I-80/I-680/SR-32 Interchange + Widening (Phases 2B-7)	Rising Tides Falling Fortunes	\$0.3B	\$0.1B	\$0.0B	\$0.0B	\$0.0B	\$0.0B	\$0.2B
				Clean And Green	\$0.9B	\$0.3B	\$0.4B	\$0.0B	\$0.0B	\$0.0B	\$0.2B
				Back To The Future	\$0.7B	\$0.3B	(\$0.2B)	\$0.3B	\$0.0B	\$0.1B	\$0.2B
	3103	74	SR-4 Widening (Brentwood to Discovery Bay)	Rising Tides Falling Fortunes	(\$0.3B)	\$0.1B	\$0.0B	(\$0.4B)	\$0.0B	\$0.1B	\$0.1B
				Clean And Green	\$0.1B	\$0.2B	(\$0.2B)	\$0.2B	\$0.0B	(\$0.1B)	\$0.0B
				Back To The Future	\$2.5B	\$1.5B	\$0.6B	\$0.3B	\$0.0B	\$0.1B	\$0.1B
			Rising Tides Falling Fortunes	\$4.5B	\$4.1B	\$0.0B	\$0.2B	\$0.0B	\$0.0B	\$0.2B	

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Project Type	Project ID	Row ID	Project	Future	Grand Total	Accessibility Benefits	Transit Crowding Benefits	Freeway Reliability and Vehicle Ownership Benefits	Environmental Benefits	Health Benefits	Safety Benefits	
Build Road Capacity - Low Cost	3106	75	SR-152 Realignment and Tolling	Clean And Green	\$0.1B	\$3.3B	\$0.9B	(\$2.5B)	(\$0.4B)	(\$0.2B)	(\$0.9B)	
				Back To The Future	(\$0.9B)	\$4.9B	(\$0.6B)	(\$1.8B)	(\$0.6B)	(\$0.0B)	(\$2.7B)	
	3109	76	SR-262 Widening and Interchange Improvements	Rising Tides Falling Fortunes	\$0.2B	\$0.2B	(\$0.2B)	(\$0.4B)	\$0.0B	\$0.2B	\$0.4B	
				Clean And Green	\$0.4B	\$0.4B	(\$0.1B)	(\$0.1B)	\$0.0B	(\$0.1B)	\$0.1B	
	3100	77	SR-239 Widening (Brentwood to Tracy including Airport Connector)	Rising Tides Falling Fortunes	\$0.7B	\$0.6B	\$0.0B	\$0.2B	(\$0.1B)	\$0.0B	\$0.1B	
				Clean And Green	\$1.0B	\$0.8B	\$0.4B	(\$0.2B)	(\$0.1B)	\$0.1B	\$0.1B	
	3105	78	SR-12 Widening (I-80 to Rio Vista)	Back To The Future	\$2.3B	\$2.3B	\$0.0B	\$0.0B	(\$0.1B)	\$0.1B	\$0.0B	
				Rising Tides Falling Fortunes	\$0.2B	\$0.1B	\$0.0B	\$0.2B	\$0.0B	\$0.0B	\$0.0B	
					Clean And Green	\$0.7B	\$0.5B	\$0.0B	\$0.1B	\$0.0B	\$0.1B	\$0.1B
					Back To The Future	\$1.8B	\$1.6B	(\$0.4B)	\$0.5B	\$0.0B	\$0.0B	\$0.1B
Optimize Existing Freeway Network	5000	79	Bay Area Forward (Phase 1: Freeway Ramp and Arterial Components Only)	Rising Tides Falling Fortunes	\$4.3B	\$3.0B	\$0.1B	\$1.2B	(\$0.1B)	\$0.0B	(\$0.7B)	
				Clean And Green	\$5.4B	\$5.3B	\$0.6B	\$0.2B	(\$0.1B)	(\$0.2B)	(\$0.4B)	
	6103	80	Demand-Based Tolling on All Highways with Means-Based Tolls	Back To The Future	\$3.5B	\$5.9B	\$1.1B	\$1.5B	(\$0.5B)	(\$0.6B)	(\$3.9B)	
				Rising Tides Falling Fortunes	\$16.5B	\$15.1B	(\$1.2B)	\$9.1B	\$0.1B	\$0.2B	(\$7.0B)	
	6102	81	HOV Lane Network with per-mile fee for SOVs	Clean And Green	\$6.1B	\$4.2B	(\$2.1B)	\$5.0B	\$0.4B	\$0.2B	(\$1.5B)	
				Back To The Future	\$68.2B	(\$5.6B)	(\$10.1B)	\$72.5B	\$1.8B	\$6.0B	\$3.5B	
					Rising Tides Falling Fortunes	\$13.5B	\$14.3B	(\$1.3B)	\$8.4B	\$1.5B	\$2.1B	(\$11.5B)
					Clean And Green	(\$4.3B)	(\$1.7B)	(\$2.9B)	\$1.2B	\$0.8B	\$1.6B	(\$2.4B)
	3003	82	San Francisco Arterial HOV and Freeway HOT Lanes	Back To The Future	\$41.7B	\$23.0B	(\$7.4B)	\$25.5B	\$0.8B	\$3.5B	(\$3.7B)	
				Rising Tides Falling Fortunes	\$0.7B	\$0.8B	\$0.2B	(\$0.1B)	\$0.0B	(\$0.1B)	\$0.0B	
2002	83	AC Transit Transbay Network: Capital Improvements + Service Increase	Clean And Green	\$1.1B	\$0.8B	\$0.5B	(\$0.1B)	\$0.0B	(\$0.1B)	\$0.1B		
			Back To The Future	\$3.2B	\$2.5B	\$0.8B	\$0.0B	\$0.0B	(\$0.1B)	\$0.1B		
6022	84	Bus Rapid Transit (BRT) on All Bridges: Dedicated Lanes + Service/Capacity Improvements	Rising Tides Falling Fortunes	\$3.2B	\$0.8B	\$1.3B	\$0.5B	\$0.0B	\$0.2B	\$0.3B		
			Clean And Green	\$4.9B	\$0.7B	\$2.8B	\$1.0B	\$0.1B	\$0.2B	\$0.2B		
6020	85	Regional Express (Rax) Bus Network + Optimized Express Lane Network	Back To The Future	\$6.2B	\$2.7B	\$2.6B	\$0.5B	\$0.0B	\$0.1B	\$0.3B		
			Rising Tides Falling Fortunes	\$0.7B	(\$0.6B)	\$0.6B	(\$0.4B)	\$0.1B	\$0.4B	\$0.6B		
				Clean And Green	\$1.3B	(\$1.6B)	\$2.0B	\$0.1B	\$0.2B	\$0.3B		
				Back To The Future	(\$15.0B)	(\$15.0B)	(\$0.2B)	(\$0.4B)	(\$0.2B)	\$0.7B	\$0.0B	
				Rising Tides Falling Fortunes	\$11.8B	\$9.6B	\$2.6B	\$0.8B	\$0.1B	\$0.3B	(\$0.6B)	
				Clean And Green	\$27.8B	\$10.2B	\$12.7B	\$3.7B	\$0.2B	\$0.9B	\$0.2B	

**Methodology Overview:** All project impacts are measured against a uniform base transportation and land use network in each future, except Resilience projects, which are measured against a baseline where that asset is out of service (hence n/a in some futures).

**Inter-regional projects:** Modeled Bay Area benefits have been multiplied by a factor to reflect the ratio of expected ridership from outside the region. Valley Link/ACE Rail benefit multiplier: 3.3; Caltrain/HSR benefit multiplier: 1.3 (the HSR multiplier is applied in Clean and Green only, the Future where HSR is completely built out).

**Description of benefits:**

**Accessibility Benefits:** Represents change in accessibility benefits to all Bay Area residents as a result of the project.

**Transit Crowding Benefits:** Captures the (dis)benefits associated with increase/decrease in crowding, since people may change their travel choices or be denied boarding, or experience discomfort in a crowded vehicle.

**Freeway Reliability and Vehicle Ownership Benefits:** Reflects change in non-recurring vehicle delay on freeways, and the costs of change in vehicle ownership as a result of the project.

**Environmental Benefits:** Captures monetary value of change in GHG emissions or impact on natural lands (wetlands, pastureland, farmland) due to the project.

**Health Benefits:** Represents benefits from increased physical activity due to more walking/biking and reduction in air pollutants and noise.

**Safety Benefits:** Captures decrease in injuries and collisions due to reduced VMT as well as operational and safety improvements such as freeway ramp redesign or grade separations.

**Note:** Societal transfers such as fare/toll revenue (or loss) are excluded from both benefits and costs, following standard practice for societal benefit-cost analyses. For Project IDs 6111 and 6112, benefit values include benefits from a suite of transit capacity expansion projects; however, only the incremental benefits of the project are used for the calculation of the Benefit-Cost Ratio in Attachment A.  
(Full methodology can be found here: [https://mtc.ca.gov/sites/default/files/ProjectPerformance\\_Methodology.pdf](https://mtc.ca.gov/sites/default/files/ProjectPerformance_Methodology.pdf))

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## Horizon/Plan Bay Area 2050: Final Project Performance Findings Attachment D: Detailed Table of Lifecycle Benefits by Future



Total number of projects: 97; 81 projects from public agencies, 12 projects (along with 4 alternate versions) from public/NGOs that were jury finalists from the Transformative Projects process.  
Row IDs correspond to Attachment A.  
(see high-level description of methodology at the bottom of the page)

All values in billions of 2019 dollars discounted present value

Project Type	Project ID	Row ID	Project	Future	Grand Total	Accessibility Benefits	Transit Crowding Benefits	Freeway Reliability and Vehicle Ownership Benefits	Environmental Benefits	Health Benefits	Safety Benefits	
Optimize Existing Freeway Network	6020	85	Regional Express (Rax) Bus Network + Optimized Express Lane Network	Back To The Future	\$22.2B	\$22.1B	\$3.5B	(\$0.5B)	(\$0.1B)	\$0.0B	(\$2.9B)	
				Rising Tides Falling Fortunes	\$1.2B	\$0.7B	(\$0.3B)	\$0.4B	\$0.0B	\$0.2B	\$0.1B	
	5003	86	I-680 Corridor Improvements (BRT, Express Bus, Shared AVs, Gondolas)	Clean And Green	\$2.1B	\$1.1B	(\$0.5B)	\$1.2B	\$0.0B	\$0.2B	\$0.1B	
				Back To The Future	\$2.8B	\$1.6B	\$0.8B	\$0.5B	\$0.0B	\$0.1B	\$0.0B	
	6104	87	Reversible Lanes on Top 10 Congested Bridges and Freeways	Rising Tides Falling Fortunes	\$0.4B	\$0.5B	\$0.3B	(\$0.4B)	\$0.0B	\$0.0B	\$0.0B	
				Clean And Green	\$0.1B	\$0.5B	(\$0.2B)	(\$0.2B)	\$0.0B	\$0.0B	\$0.0B	
	6003	88	I-80 Corridor Overhaul with Per-Mile Tolling	Back To The Future	(\$0.7B)	(\$1.0B)	(\$0.3B)	\$0.1B	\$0.0B	\$0.2B	\$0.2B	
				Rising Tides Falling Fortunes	(\$2.1B)	(\$1.9B)	(\$0.8B)	\$0.6B	\$0.3B	\$0.1B	(\$0.4B)	
					Clean And Green	(\$3.1B)	(\$2.4B)	(\$1.5B)	\$0.5B	\$0.4B	\$0.1B	(\$0.1B)
					Back To The Future	(\$6.5B)	(\$3.6B)	(\$3.5B)	\$0.7B	\$0.2B	\$0.1B	(\$0.3B)
6021	89	Bus Rapid Transit (BRT) on All Bridges: Dedicated Lanes only	Rising Tides Falling Fortunes	(\$2.5B)	(\$1.5B)	(\$0.7B)	(\$1.1B)	\$0.1B	\$0.4B	\$0.4B		
			Clean And Green	(\$2.8B)	(\$2.4B)	(\$0.6B)	(\$0.4B)	\$0.2B	\$0.1B	\$0.3B		
				Back To The Future	(\$21.1B)	(\$18.4B)	(\$1.7B)	(\$1.3B)	(\$0.2B)	\$0.7B	(\$0.2B)	
				Rising Tides Falling Fortunes	\$12.0B	\$11.0B	\$1.2B	\$0.2B	(\$0.2B)	(\$0.5B)	(\$0.2B)	
Resilience	7002	91	I-580/US-101/SMART Marin Resilience Project	Clean And Green	\$12.7B	\$12.1B	\$1.6B	\$0.0B	(\$0.3B)	(\$0.4B)	(\$0.3B)	
				Back To The Future	\$20.0B	\$21.0B	\$1.6B	(\$1.7B)	\$0.0B	(\$0.8B)	\$0.0B	
	7005	92	SR-237 Resilience Project (Alviso)	Rising Tides Falling Fortunes	\$2.2B	\$1.9B	\$0.0B	\$0.3B	\$0.0B	(\$0.1B)	\$0.2B	
				Back To The Future	\$11.1B	\$11.8B	\$1.9B	(\$1.7B)	(\$0.1B)	(\$0.7B)	(\$0.1B)	
	7006	93	I-880 Resilience Project (South Fremont)	Rising Tides Falling Fortunes	\$4.0B	\$2.9B	\$0.1B	\$1.1B	(\$0.1B)	(\$0.1B)	\$0.3B	
				Clean And Green	\$4.7B	\$4.8B	\$0.4B	\$0.6B	(\$0.1B)	(\$0.3B)	(\$0.6B)	
	7003	95	US-101 Peninsula Resilience Project (San Antonio R...)	Rising Tides Falling Fortunes	\$2.7B	\$2.8B	\$0.6B	\$0.1B	(\$0.1B)	(\$0.3B)	(\$0.4B)	
				Clean And Green	\$1.0B	\$0.3B	\$0.2B	\$0.5B	\$0.0B	\$0.1B	\$0.0B	
	7001	96	VTA LRT Resilience Project (Asman West)	Back To The Future	\$1.1B	\$0.7B	(\$0.4B)	\$1.1B	\$0.0B	\$0.3B	\$0.1B	
				Rising Tides Falling Fortunes	\$1.6B	\$1.6B	(\$1.2B)	\$0.8B	\$0.0B	\$0.3B	\$0.1B	
3200	97	SR-37 Long Term Project (Tolling, Elevation, Interchanges, Widening, Express Bus)	Clean And Green	\$12.2B	\$2.1B	\$0.4B	\$0.4B	\$9.3B	(\$0.1B)	\$0.2B		
			Back To The Future	\$13.3B	\$2.7B	\$1.0B	\$0.5B	\$9.3B	(\$0.2B)	\$0.1B		
				Rising Tides Falling Fortunes	\$12.2B	\$2.1B	\$0.4B	\$0.4B	\$9.3B	(\$0.1B)	\$0.2B	
				Clean And Green	\$13.3B	\$2.7B	\$1.0B	\$0.5B	\$9.3B	(\$0.2B)	\$0.1B	
				Back To The Future	\$12.6B	\$2.3B	(\$0.4B)	\$1.1B	\$9.4B	(\$0.1B)	\$0.3B	

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Horizon/Plan Bay Area 2050: Final Project Performance Findings  
Attachment E: Detailed Table of Lifecycle Costs



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(see high-level description of methodology at the bottom of the page)

Lifecycle costs in billions of 2019 dollars discounted present value; Project costs in billions of 2019 dollars

Project Type	Project ID	Row ID	Project	Project Source	Total Lifecycle Cost (billions of discounted present value 2019\$)	Lifecycle Costs (billions of discounted present value 2019 dollars)				Project Costs (2019\$B) (as reviewed with sponsor)	
						Initial Capital Cost	O&M	Rehab + Replacement	Residual Value	Initial Capital Cost	Annual O&M
Build Core Rail	1004	1	New San Francisco-Oakland Transbay Rail Crossing - Commuter Rail (Crossing 5)	Crossings Study	\$46.1B	\$39.2B	\$7.4B	\$4.2B	(\$4.7B)	\$45.9B	\$0.4B
	1007	2	New San Francisco-Oakland Transbay Rail Crossing - BART + Commuter Rail (Crossing 7)	Crossings Study	\$83.5B	\$74.1B	\$12.4B	\$6.9B	(\$9.8B)	\$86.8B	\$0.7B
	1002	3	New San Francisco-Oakland Transbay Rail Crossing - BART (Crossing 3: Mission St)	Crossings Study	\$36.2B	\$33.8B	\$4.8B	\$2.6B	(\$5.0B)	\$39.6B	\$0.3B
	1003	4	New San Francisco-Oakland Transbay Rail Crossing - BART (Crossing 4: New Markets)	Crossings Study	\$37.4B	\$34.9B	\$4.9B	\$2.7B	(\$5.1B)	\$40.9B	\$0.3B
	2300	5	Caltrain Downtown Extension	TJPA	\$4.8B	\$4.4B	\$0.7B	\$0.1B	(\$0.5B)	\$4.9B	\$0.0B
	2205	6	BART to Silicon Valley (Phase 2)	VTA	\$6.0B	\$4.7B	\$1.3B	\$0.5B	(\$0.5B)	\$5.2B	\$0.1B
	2306	7	Dumbarton Rail (Redwood City to Union City)	SamTrans + CCA	\$3.9B	\$2.7B	\$1.1B	\$0.4B	(\$0.3B)	\$3.0B	\$0.1B
	2310	8	Megaregional Rail Network + Resilience Project (Caltrain, ACE, Valley Link, Dumbarton, Cap Cor)	City of San Jose	\$54.1B	\$47.0B	\$9.9B	\$2.4B	(\$5.1B)	\$55.9B	\$0.6B
	2208	9	BART Gap Closure (Millbrae to Silicon Valley)	VTA	\$40.4B	\$43.2B	\$1.1B	\$2.2B	(\$6.0B)	\$50.7B	\$0.1B
	6002	10	SMART to Richmond via New Richmond-San Rafael Bridge	Public/NGO Submission	\$5.0B	\$5.4B	\$0.1B	\$0.1B	(\$0.7B)	\$6.3B	\$0.0B
Extend Rail Network - High Cost	2208	11	Valley Link (Dublin to San Joaquin Valley)	TYS/VRRA	\$3.0B	\$2.0B	\$0.7B	\$0.5B	(\$0.2B)	\$2.2B	\$0.0B
	2309	12	Altamont Corridor Vision Phase 1 (to San Joaquin Valley)	TYS/VRRA, SJRRRC	\$4.6B	\$3.3B	\$1.0B	\$0.7B	(\$0.2B)	\$3.5B	\$0.0B
	2206	13	BART Extension from Diridon to Cupertino	VTA	\$12.1B	\$11.1B	\$1.5B	\$0.9B	(\$1.5B)	\$13.0B	\$0.1B
	2207	14	BART Extension from Diridon to Gilroy (replacing existing Caltrain)	VTA	\$17.7B	\$14.2B	\$2.9B	\$2.3B	(\$1.7B)	\$16.6B	\$0.2B
	2204	15	BART on I-680 (Walnut Creek to West Dublin/Pleasanton)	Caltrans	\$11.0B	\$9.4B	\$0.9B	\$1.4B	(\$0.7B)	\$10.2B	\$0.0B
	2203	16	BART to Hercules & I-80 Bus from Vallejo to Oakland	CCTA	\$5.8B	\$4.1B	\$0.5B	\$1.5B	(\$0.3B)	\$4.5B	\$0.0B
Extend Rail Network - Low Cost	2312	17	ACE Rail Service Increase (Daily Roundtrips)	SJRRRC	\$1.3B	\$0.8B	\$0.5B	\$0.1B	(\$0.1B)	\$0.9B	\$0.0B
	2202	18	BART DMU Extension to Brentwood	CCTA	\$0.6B	\$0.4B	\$0.1B	\$0.1B	\$0.0B	\$0.4B	\$0.0B
	2305	19	SMART to Sonoma (Novato to Susan City, without sea level rise protections)	SMART	\$1.6B	\$1.1B	\$0.2B	\$0.4B	(\$0.1B)	\$1.2B	\$0.0B
	2304	20	SMART Extension to Cloverdale	SMART	\$0.5B	\$0.3B	\$0.1B	\$0.0B	\$0.0B	\$0.4B	\$0.0B
Optimize Existing Transit Network - High Cost	2201	21	BART Core Capacity	BART	\$4.5B	\$2.8B	\$1.2B	\$0.8B	(\$0.4B)	\$3.2B	\$0.1B
	2001	22	AC Transit Local Rapid Network: Capital Improvements + Service Increase	AC Transit	\$6.4B	\$2.5B	\$2.4B	\$1.6B	(\$0.1B)	\$2.6B	\$0.1B
	2303	23	Caltrain Full Electrification and Blended System: High Growth	VTA, City of San Jose	\$31.3B	\$26.5B	\$6.3B	\$1.1B	(\$2.5B)	\$30.6B	\$0.3B
	2302	24	Caltrain Full Electrification and Blended System: Moderate Growth	Caltrain + HSR	\$24.6B	\$21.8B	\$4.4B	\$0.8B	(\$2.3B)	\$25.9B	\$0.2B
	2005	25	Alameda County BRT Network + Connected Vehicle Corridors	ACTC	\$4.0B	\$1.1B	\$2.2B	\$0.7B	(\$0.1B)	\$1.2B	\$0.1B
	2410	26	VTA LRT Systemwide Grade Separation and Full Automation	City of San Jose	\$14.8B	\$15.4B	\$0.2B	\$0.8B	(\$1.6B)	\$17.3B	\$0.0B
	2409	27	VTA LRT Systemwide Grade Separation	VTA	\$11.6B	\$12.2B	\$0.2B	\$0.7B	(\$1.5B)	\$14.2B	\$0.0B
	2401	28	North San Jose LRT Subway	VTA	\$4.9B	\$5.3B	\$0.1B	\$0.1B	(\$0.7B)	\$5.8B	\$0.0B
	2411	29	VTA LRT Systemwide Grade Separation, Network Expansion, and Full Automation	VTA, City of San Jose	\$44.2B	\$44.1B	\$2.1B	\$2.9B	(\$4.9B)	\$49.6B	\$0.1B
	2407	30	Muni Metro Southwest M-Line Subway	SFCTA	\$5.6B	\$3.7B	\$2.2B	\$0.2B	(\$0.5B)	\$4.1B	\$0.1B
Optimize Existing Transit Network - Low Cost	2301	31	Caltrain Full Electrification and Blended System: Base Growth	Caltrain + HSR	\$20.9B	\$19.0B	\$3.4B	\$0.5B	(\$2.1B)	\$22.6B	\$0.2B
	3001	32	Downtown San Francisco Congestion Pricing	SF	\$0.8B	\$0.1B	\$0.6B	\$0.1B	\$0.0B	\$0.1B	\$0.0B
	6111	33	Integrated Transit Fare System (with Transit Capacity Expansion)	Public/NGO Submission	\$0.3B	\$0.2B	\$0.0B	\$0.1B	\$0.0B	\$0.2B	\$0.0B
6112	34	Integrated Transit Fare System and Seamless Transfers (with Transit Capacity Expansion)	Public/NGO Submission	\$0.5B	\$0.3B	\$0.0B	\$0.1B	\$0.0B	\$0.4B	\$0.0B	

Lifecycle Costs (calculated using discounted present value methodology):

Initial Capital Cost: Capital cost of constructing/implementing the project.

O&M: Annual operating and maintenance costs of the project over the full analysis period.

Rehab + Replacement: Rehabilitation costs of pavement and roadway structures; replacement costs of roadway and transit assets after their useful lives.

(e.g. bus replacement every 14 years, roadway technology every 20 years)

Residual Value: Represents useful value of assets/infrastructure at the end of the analysis period (based on straight line depreciation).

Project Costs (as reviewed with sponsor):

Reflects sponsor submitted costs of projects. These were revised in some cases when a high-level cost review of all projects using an independent cost consultant, and a uniform methodology flagged sponsor costs that may have been underestimated (such cases were discussed with the sponsors individually).

Note: Societal transfers such as fare/bill revenue (or loss) are excluded from both benefits and costs, following standard practice for societal benefit-cost analyses.

(Full methodology can be found here: [https://mtr.ca.gov/sites/default/files/ProjectPerformance\\_Methodology.pdf](https://mtr.ca.gov/sites/default/files/ProjectPerformance_Methodology.pdf))

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(see high-level description of methodology at the bottom of the page)

Lifecycle costs in billions of 2019 dollars discounted present value; Project costs in billions of 2019 dollars

Project Type	Project ID	Row ID	Project	Project Source	Total Lifecycle Cost (billions of discounted present value 2019\$)	Lifecycle Costs (billions of discounted present value 2019 dollars)				Project Costs (2019\$B) (as reviewed with sponsor)	
						Initial Capital Cost	O&M	Rehab + Replacement	Residual Value	Initial Capital Cost	Annual O&M
Optimize Existing Transit Network - Low Cost	2209	35	Irvine/Bart Infill Station	ACTC	\$0.2B	\$0.1B	\$0.1B	\$0.0B	\$0.0B	\$0.1B	\$0.0B
	3002	36	Treasure Island Congestion Pricing	SF	\$0.3B	\$0.0B	\$0.3B	\$0.0B	\$0.0B	\$0.1B	\$0.0B
	2007	37	San Francisco Southeast Waterfront Transit Improvements	SF	\$0.6B	\$0.2B	\$0.3B	\$0.1B	\$0.0B	\$0.2B	\$0.0B
	2100	38	San Pablo BRT	AC Transit	\$0.5B	\$0.3B	\$0.0B	\$0.2B	\$0.0B	\$0.3B	\$0.0B
	2008	39	Alameda Point Transit Network Improvements	ACTC	\$0.5B	\$0.1B	\$0.4B	\$0.0B	\$0.0B	\$0.1B	\$0.0B
	2000	40	AC Transit Local Network: Service Increase	AC Transit	\$2.6B	\$0.2B	\$2.2B	\$0.2B	\$0.0B	\$0.2B	\$0.1B
	2101	41	Geary BRT (Phase 2)	SF	\$0.6B	\$0.2B	\$0.3B	\$0.2B	\$0.0B	\$0.2B	\$0.0B
	2105	42	Alameda County EA4th St/Mission and Fremont Blvd Multimodal Corridor	ACTC	\$0.5B	\$0.3B	\$0.0B	\$0.2B	\$0.0B	\$0.3B	\$0.0B
	2103	43	SanTrans El Camino Real BRT: Capital and Service Improvements	CCAG	\$0.6B	\$0.2B	\$0.3B	\$0.1B	\$0.0B	\$0.2B	\$0.0B
	2003	44	Muni Forward: Capital Improvements + Service Increase	SF	\$2.9B	\$0.4B	\$2.1B	\$0.4B	\$0.0B	\$0.5B	\$0.1B
Build Local Transit	6100	45	Integrated Transit Fare System	Public/NGO Submission	\$0.3B	\$0.2B	\$0.1B	\$0.1B	\$0.0B	\$0.2B	\$0.0B
	2004	46	Sonoma Countywide Bus: Service Increase	SCTA	\$0.9B	\$0.3B	\$0.4B	\$0.3B	\$0.0B	\$0.3B	\$0.0B
	2400	47	Downtown San Jose LRT Subway	VTA	\$1.9B	\$2.2B	(\$0.1B)	\$0.1B	(\$0.3B)	\$2.4B	\$0.0B
	6106	48	Free Transit for Low-Income Households	Public/NGO Submission	\$0.1B	\$0.0B	\$0.1B	\$0.0B	\$0.0B	\$0.1B	\$0.0B
	6101	49	Free Transit for All	Public/NGO Submission	\$0.1B	\$0.0B	\$0.1B	\$0.0B	\$0.0B	\$0.1B	\$0.0B
	4000	50	Oakland/Alameda Gondola Network	City of Oakland	\$1.1B	\$0.7B	\$0.2B	\$0.3B	\$0.0B	\$0.7B	\$0.0B
	4001	51	Mountain View AV Network (Free Fare, Subsidies from Companies)	City of Mountain View	\$1.4B	\$1.3B	\$0.2B	\$0.0B	(\$0.1B)	\$1.4B	\$0.0B
	2403	52	Vasona LRT Extension (Phase 2)	VTA	\$0.3B	\$0.2B	\$0.0B	\$0.0B	\$0.0B	\$0.2B	\$0.0B
	2412	53	SR-85 LRT (Mountain View to US101 Interchange)	City of Cupertino	\$3.7B	\$2.6B	\$0.5B	\$0.8B	(\$0.2B)	\$2.9B	\$0.0B
	2408	54	Muni Metro T-Third Extension to South San Francisco	City of South San Francisco	\$1.8B	\$1.1B	\$0.4B	\$0.3B	(\$0.1B)	\$1.2B	\$0.0B
Enhance Alternate Modes	4002	55	Contra Costa Autonomous Shuttle Program	CCTA	\$3.4B	\$1.3B	\$0.9B	\$1.2B	(\$0.1B)	\$1.4B	\$0.0B
	4003	56	Cupertino-Mountain View-San Jose Elevated Maglev Rail Loop	City of Cupertino	\$8.1B	\$7.2B	\$0.3B	\$1.1B	(\$0.6B)	\$7.9B	\$0.0B
	2402	57	San Jose Airport People-Mover	VTA	\$1.4B	\$1.1B	\$0.2B	\$0.2B	(\$0.1B)	\$1.2B	\$0.0B
	2600	58	WETA Ferry Service Frequency Increase	WETA	\$0.4B	\$0.0B	\$0.3B	\$0.0B	\$0.0B	\$0.0B	\$0.0B
	6006	59	Enhanced Regionwide Bike Infrastructure	MTC/ABAG	\$12.6B	\$7.4B	\$0.8B	\$4.8B	(\$0.4B)	\$8.3B	\$0.0B
	2602	60	WETA Ferry Service: Berkeley - San Francisco	WETA	\$0.2B	\$0.0B	\$0.2B	\$0.0B	\$0.0B	\$0.1B	\$0.0B
Build Road Capacity - High Cost	2700	61	Bay Bridge West Span Bike Path	MTC/ABAG	\$0.8B	\$0.5B	\$0.1B	\$0.3B	\$0.0B	\$0.5B	\$0.0B
	2603	62	WETA Ferry Service: Redwood City - San Francisco - Oakland	WETA	\$0.3B	\$0.1B	\$0.3B	\$0.0B	\$0.0B	\$0.1B	\$0.0B
	4004	63	Regional Hoversion Network	CCAG	\$2.6B	\$0.8B	\$1.7B	\$0.2B	\$0.0B	\$0.9B	\$0.1B
	6004	64	Bay Trail Completion	Public/NGO Submission	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Build Road Capacity - High Cost	6005	65	Regional Bicycles Superhighway Network	Public/NGO Submission	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	1001	66	Southern Crossing Bridge + New San Francisco-Oakland Transbay Rail Crossing - BART (Crossing 6)	Crossings Study	\$47.1B	\$45.0B	\$5.7B	\$3.0B	(\$6.5B)	\$52.7B	\$0.3B
	3000	67	Regional Express Lanes (MTC + VTA + ACTC + US-101)	MTC/ABAG	\$12.1B	\$5.6B	\$3.7B	\$3.1B	(\$0.2B)	\$6.1B	\$0.2B
1005	68	Mid-Bay Bridge (I-238 to I-380) (Crossing 2)	Crossings Study	\$19.9B	\$14.8B	\$0.8B	\$5.6B	(\$1.3B)	\$17.4B	\$0.0B	

Lifecycle Costs (calculated using discounted present value methodology):

Initial Capital Cost: Capital cost of constructing/implementing the project.

O&M: Annual operating and maintenance costs of the project over the full analysis period.

Rehab + Replacement: Rehabilitation costs of pavement and roadway structures; replacement costs of roadway and transit assets after their useful lives.

(e.g. bus replacement every 14 years, roadway technology every 20 years)

Residual Value: Represents useful value of assets/infrastructure at the end of the analysis period (based on straight line depreciation).

Project Costs (as reviewed with sponsor):

Reflects sponsor submitted costs of projects. These were revised in some cases when a high-level cost review of all projects using an independent cost consultant, and a uniform methodology flagged sponsor costs that may have been underestimated (such cases were discussed with the sponsors individually).

Note: Societal transfers such as fare/bill revenue (or loss) are excluded from both benefits and costs, following standard practice for societal benefit-cost analyses.

(Full methodology can be found here: [https://mtr.ca.gov/sites/default/files/ProjectPerformance\\_Methodology.pdf](https://mtr.ca.gov/sites/default/files/ProjectPerformance_Methodology.pdf))

Horizon/Plan Bay Area 2050: Final Project Performance Findings  
Attachment E: Detailed Table of Lifecycle Costs



Total number of projects: 97; 81 projects from public agencies, 12 projects (along with 4 alternate versions) from public/NGOs that were jury finalists from the Transformative Projects process. Row IDs correspond to Attachment A. (see high-level description of methodology at the bottom of the page)

Lifecycle costs in billions of 2019 dollars discounted present value; Project costs in billions of 2019 dollars

Project Type	Project ID	Row ID	Project	Project Source	Total Lifecycle Cost (billions of discounted present value 2019\$)	Lifecycle Costs (billions of discounted present value 2019 dollars)				Project Costs (2019\$) (as reviewed with sponsor)	
						Initial Capital Cost	OBM	Rehab + Replacement	Residual Value	Initial Capital Cost	Annual OBM
- Source Review & Approval											
- High Cost	1006	69	San Mateo Bridge Reconstruction and Widening (Crossing 1)	Crossings Study	\$15.7B	\$11.4B	\$0.6B	\$4.6B	(\$1.0B)	\$13.4B	\$0.0B
Build Road Capacity	3101	70	I-680/SR-4 Interchange Improvements (Direct/HOV Connectors, Ramp Widening, Auxiliary Lanes)	CCTA	\$0.4B	\$0.3B	\$0.0B	\$0.1B	\$0.0B	\$0.3B	\$0.0B
- Low Cost	3110	71	Union City-Fremont East-West Connector	ACTC	\$0.4B	\$0.3B	\$0.0B	\$0.1B	\$0.0B	\$0.3B	\$0.0B
	3102	72	SR-4 Operational Improvements	CCTA	\$0.5B	\$0.3B	\$0.0B	\$0.2B	\$0.0B	\$0.4B	\$0.0B
	3104	73	I-80/I-680/SR-12 Interchange + Widening (Phases 2B-7)	STA	\$0.7B	\$0.5B	\$0.0B	\$0.3B	\$0.0B	\$0.5B	\$0.0B
	3103	74	SR-4 Widening (Brentwood to Discovery Bay)	CCTA	\$0.4B	\$0.3B	\$0.0B	\$0.2B	\$0.0B	\$0.3B	\$0.0B
	3106	75	SR-152 Realignment and Tolling	VTA	\$1.9B	\$1.2B	\$0.1B	\$0.7B	(\$0.1B)	\$1.2B	\$0.0B
	3109	76	SR-262 Widening and Interchange Improvements	ACTC	\$1.2B	\$1.0B	\$0.0B	\$0.3B	(\$0.1B)	\$1.1B	\$0.0B
	3100	77	SR-239 Widening (Brentwood to Tracy including Airport Connector)	CCTA	\$2.4B	\$1.8B	\$0.0B	\$0.7B	(\$0.1B)	\$2.1B	\$0.0B
	3105	78	SR-12 Widening (I-80 to Rio Vista)	STA	\$2.5B	\$1.7B	\$0.1B	\$0.9B	(\$0.1B)	\$1.9B	\$0.0B
Optimize Existing Freeway Network	5000	79	Bay Area Forward (Phase 5: Freeway Ramp and Arterial Components Only)	MTJ/ABAG	\$0.6B	\$0.3B	\$0.1B	\$0.2B	\$0.0B	\$0.3B	\$0.0B
	6103	80	Demand Based Tolling on All Highways with Means-Based Tolls	Public/NGO Submission	\$7.7B	\$1.9B	\$4.4B	\$1.5B	(\$0.2B)	\$2.0B	\$0.2B
	6102	81	HOV Lane Network with per-mile fee for SOVs	Public/NGO Submission	\$7.7B	\$1.9B	\$4.4B	\$1.5B	(\$0.2B)	\$2.0B	\$0.2B
	3003	82	San Francisco Arterial HOV and Freeway HOT Lanes	SF	\$1.3B	\$0.7B	\$0.1B	\$0.5B	(\$0.1B)	\$0.8B	\$0.0B
	2002	83	AC Transit Transbay Network: Capital Improvements + Service Increase	AC Transit	\$6.5B	\$2.2B	\$2.8B	\$1.6B	(\$0.2B)	\$2.4B	\$0.1B
	6022	84	Bus Rapid Transit (BRT) on All Bridges: Dedicated Lanes + Service/Capacity Improvements	Public/NGO Submission	\$1.2B	\$0.2B	\$0.8B	\$0.2B	\$0.0B	\$0.2B	\$0.0B
	6020	85	Regional Express (ReX) Bus Network + Optimized Express Lane Network	Public/NGO Submission	\$41.0B	\$18.6B	\$19.5B	\$4.8B	(\$1.8B)	\$20.5B	\$0.9B
	5003	86	I-680 Corridor Improvements (BRT, Express Bus, Shared AVs, Gondolas)	CCTA	\$4.6B	\$1.3B	\$2.6B	\$0.8B	(\$0.1B)	\$1.4B	\$0.1B
	6104	87	Reversible Lanes on Top 10 Congested Bridges and Freeways	Public/NGO Submission	\$2.4B	\$1.5B	\$0.2B	\$0.8B	(\$0.1B)	\$1.6B	\$0.0B
	6003	88	I-80 Corridor Overhaul with Per-Mile Tolling	Public/NGO Submission	\$3.9B	\$3.4B	\$0.1B	\$0.8B	(\$0.4B)	\$4.0B	\$0.0B
	6021	89	Bus Rapid Transit (BRT) on All Bridges: Dedicated Lanes only	Public/NGO Submission	\$0.2B	\$0.1B	\$0.0B	\$0.1B	\$0.0B	\$0.1B	\$0.0B
	6105	90	Timing Regulation of Freight Delivery	Public/NGO Submission	n/a						
Resilience	7002	91	I-580/US-101/SMART Marin Resilience Project	MTJ/ABAG/BCDC	\$0.2B	\$0.1B	\$0.0B	\$0.1B	\$0.0B	\$0.1B	\$0.0B
	7005	92	SR-237 Resilience Project (Alviso)	MTJ/ABAG/BCDC	\$0.2B	\$0.1B	\$0.0B	\$0.1B	\$0.0B	\$0.1B	\$0.0B
	7006	93	I-880 Resilience Project (South Fremont)	MTJ/ABAG/BCDC	\$0.1B	\$0.0B	\$0.0B	\$0.0B	\$0.0B	\$0.0B	\$0.0B
	7004	94	SR-88 Resilience Project (Dumbarton Bridge, I-68 Interchange)	MTJ/ABAG/BCDC	\$0.2B	\$0.1B	\$0.0B	\$0.0B	\$0.0B	\$0.1B	\$0.0B
	7003	95	US-101 Peninsula Resilience Project (San Antonio Rd, Poplar Ave, Millbrae Ave)	MTJ/ABAG/BCDC	\$0.2B	\$0.1B	\$0.0B	\$0.1B	\$0.0B	\$0.1B	\$0.0B
	7001	96	VTA LRT Resilience Project (Fasman West)	MTJ/ABAG/BCDC	\$0.2B	\$0.1B	\$0.0B	\$0.1B	\$0.0B	\$0.1B	\$0.0B
	3200	97	SR-37 Long Term Project (Tolling, Elevation, Interchanges, Widening, Express Bus)	MTJ/ABAG/North Bay Count...	\$6.0B	\$4.3B	\$0.3B	\$1.7B	(\$0.4B)	\$4.8B	\$0.0B

Lifecycle Costs (calculated using discounted present value methodology):

Initial Capital Cost: Capital cost of constructing/implementing the project.

OBM: Annual operating and maintenance costs of the project over the full analysis period.

Rehab + Replacement: Rehabilitation costs of pavement and roadway structures; replacement costs of roadway and transit assets after their useful lives.

(e.g. bus replacement every 14 years, roadway technology every 20 years)

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Project Costs (as reviewed with sponsor):

Reflects sponsor submitted costs of projects. These were revised in some cases when a high-level cost review of all projects using an independent cost consultant.

and a uniform methodology flagged sponsor costs that may have been underestimated (such cases were discussed with the sponsors individually).

Note: Societal transfers such as fare/toll revenue (or loss) are excluded from both benefits and costs, following standard practice for societal benefit-cost analyses.

(Full methodology can be found here: [https://mtc.ca.gov/sites/default/files/ProjectPerformance\\_Methodology.pdf](https://mtc.ca.gov/sites/default/files/ProjectPerformance_Methodology.pdf))

# Appendix 4 | Confidence Assessment

## APPENDIX 4

### Horizon/Plan Bay Area 2050: Final Project Performance Findings Attachment F: Confidence Assessment - Project-Specific Considerations

This section of the Confidence Assessment comments on limitations of project performance evaluation across two criteria: Travel Model Accuracy and Framework Completeness. If a criterion is marked X, see comments to the right. Row IDs correspond to Attachment A.

Project Type	Row ID	Project ID	Project	Travel Model Accuracy	Framework Completeness	Comments
Build Core Rail	1	1004	New San Francisco-Oakland Transbay Rail Crossing - Commuter Rail (Crossing 5)		X	The analysis does not capture the benefits of providing redundancy in the San Francisco-Oakland Transbay Corridor.
	2	1007	New San Francisco-Oakland Transbay Rail Crossing - BART + Commuter Rail (Crossing 7)		X	The analysis does not capture the benefits of providing redundancy in the San Francisco-Oakland Transbay Corridor.
	3	1002	New San Francisco-Oakland Transbay Rail Crossing - BART (Crossing 3: Mission St)		X	The analysis does not capture the benefits of providing redundancy in the San Francisco-Oakland Transbay Corridor.
	4	1003	New San Francisco-Oakland Transbay Rail Crossing - BART (Crossing 4: New Markets)		X	The analysis does not capture the benefits of providing redundancy in the San Francisco-Oakland Transbay Corridor.
	5	2300	Caltrain Downtown Extension			-
	6	2205	BART to Silicon Valley (Phase 2)			-
	7	2306	Dumbarton Rail (Redwood City to Union City)		X	The analysis does not capture the benefits of providing redundancy in the Dumbarton Bridge Corridor.
	8	2310	Megaregional Rail Network + Resilience Project (Caltrain, ACE, Valley Link, Dumbarton, Cap Cor)			-
	9	2208	BART Gap Closure (Millbrae to Silicon Valley)			-
	10	6002	SMART to Richmond via New Richmond-San Rafael Bridge			-

Horizon/Plan Bay Area 2050: Final Project Performance Findings  
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Project Type	Row ID	Project ID	Project	Travel Model Accuracy	Framework Completeness	Comments
Extend Rail Network - High Cost	11	2308	Valley Link (Dublin to San Joaquin Valley)	X		The travel model is not able to capture project benefits that may accrue to residents outside the nine-county Bay Area. For this reason, an off-model multiplier of 3.3 was used for all benefits of the project to reflect the ratio of expected ridership from outside the region. However, this might under or over represent benefits since ridership is not an accurate proxy for project benefits, but may be the best readily available proxy.
	12	2309	Altamont Corridor Vision Phase 1 (to San Joaquin Valley)	X		The travel model is not able to capture project benefits that may accrue to residents outside the nine-county Bay Area. For this reason, an off-model multiplier of 3.3 was used for all benefits of the project to reflect the ratio of expected ridership from outside the region. However, this might under or over represent benefits since ridership is not an accurate proxy for project benefits, but may be the best readily available proxy.
	13	2206	BART Extension from Diridon to Cupertino			-
	14	2207	BART Extension from Diridon to Gilroy (replacing existing Caltrain)			-
	15	2204	BART on I-680 (Walnut Creek to West Dublin/Pleasanton)			-
	16	2203	BART to Hercules & I-80 Bus from Vallejo to Oakland			-

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Project Type	Row ID	Project ID	Project	Travel Model Accuracy	Framework Completeness	Comments
Extend Rail Network - Low Cost	17	2312	ACE Rail Service Increase (10 Daily Roundtrips)	X		The travel model is not able to capture project benefits that may accrue to residents outside the nine-county Bay Area. For this reason, an off-model multiplier of 3.3 was used for all benefits of the project to reflect the ratio of expected ridership from outside the region. However, this might under or over represent benefits since ridership is not an accurate proxy for project benefits, but may be the best readily available proxy.
	18	2202	BART DMU Extension to Brentwood			-
	19	2305	SMART to Solano (Novato to Suisun City, without sea level rise protections)		X	The analysis does not capture the cost of investment necessary for protection from sea level rise and hence may overestimate the benefit-cost ratio. The analysis does not capture some potential benefits of the project such as allowing freight rail service and providing infrastructure redundancy during emergency evacuations. Other potential benefits of the project may include providing rural broadband infrastructure and dark fiber access.
	20	2304	SMART Extension to Cloverdale	X	X	Analysis is performed for a typical weekday, but many of the project's benefits may be accrued on weekends due to recreational use and tourism. Further, the analysis does not capture some potential benefits of the project such as allowing freight rail service and providing infrastructure redundancy during emergency evacuations. Other potential benefits of the project may include providing rural broadband infrastructure and dark fiber access.

Horizon/Plan Bay Area 2050: Final Project Performance Findings  
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Project Type	Row ID	Project ID	Project	Travel Model Accuracy	Framework Completeness	Comments
Optimize Existing Transit Network - High Cost	21	2201	BART Core Capacity		X	This project evaluation may be affected by the transit reliability and grade separation limitations discussed in the first section of the Confidence Assessment.
	22	2001	AC Transit Local Rapid Network: Capital Improvements + Service Increase		X	This project evaluation may be affected by the transit reliability limitation discussed in the first section of the Confidence Assessment.
	23	2303	Caltrain Full Electrification and Blended System: High Growth	X	X	This project evaluation may be affected by the transit reliability and grade separation limitations discussed in the first section of the Confidence Assessment. Further, air quality benefits of converting diesel vehicles to electric vehicles are not included in this assessment. However, most of the diesel-electric conversion is already committed and this project would electrify only the few remaining diesel trains.
	24	2302	Caltrain Full Electrification and Blended System: Moderate Growth	X	X	This project evaluation may be affected by the transit reliability and grade separation limitations discussed in the first section of the Confidence Assessment. Further, air quality benefits of converting diesel vehicles to electric vehicles are not included in this assessment. However, most of the diesel-electric conversion is already committed and this project would electrify only the few remaining diesel trains.
	25	2005	Alameda County BRT Network + Connected Vehicle Corridors		X	This project evaluation may be affected by the transit reliability limitation discussed in the first section of the Confidence Assessment.
	26	2410	VTA LRT Systemwide Grade Separation and Full Automation		X	This project evaluation may be affected by the transit reliability and grade separation limitations discussed in the first section of the Confidence Assessment.
	27	2409	VTA LRT Systemwide Grade Separation		X	This project evaluation may be affected by the transit reliability and grade separation limitations discussed in the first section of the Confidence Assessment.
	28	2401	North San Jose LRT Subway		X	This project evaluation may be affected by the transit reliability and grade separation limitations discussed in the first section of the Confidence Assessment.
	29	2411	VTA LRT Systemwide Grade Separation, Network Expansion, and Full Automation		X	This project evaluation may be affected by the transit reliability and grade separation limitations discussed in the first section of the Confidence Assessment.

Horizon/Plan Bay Area 2050: Final Project Performance Findings  
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Project Type	Row ID	Project ID	Project	Travel Model Accuracy	Framework Completeness	Comments
	30	2407	Muni Metro Southwest M-Line Subway	X	X	The travel model does not take into account the 50% discounted Muni Lifeline pass for low income residents. Integrating this program may improve the equity score for the project. This project evaluation may be affected by the transit reliability and grade separation limitations discussed in the first section of the Confidence Assessment.
	31	2301	Caltrain Full Electrification and Blended System: Base Growth	X	X	This project evaluation may be affected by the transit reliability and grade separation limitations discussed in the first section of the Confidence Assessment. Further, air quality benefits of converting diesel vehicles to electric vehicles are not included in this assessment. However, most of the diesel-electric conversion is already committed and this project would electrify only the few remaining diesel trains.
Optimize Existing Transit Network - Low Cost	32	3001	Treasure Island Congestion Pricing	X		The travel model does not take into account the affordability program that is built in to the design of the project, which includes subsidized transit passes and discounts to services such as car/bike share. This may have an adverse impact on the equity score of the project.
	33	6111	Integrated Transit Fare System (with Transit Capacity Expansion)	X		While the evaluation captures increase in ridership due to lower overall fares, it does not take into account the potential increase in ridership from simplifying the existing complex fare system, and hence may be underestimating the benefits of the project.
	34	6112	Integrated Transit Fare System and Seamless Transfers (with Transit Capacity Expansion)	X		While the evaluation captures increase in ridership due to lower overall fares, it does not take into account the potential increase in ridership from simplifying the existing complex fare system, and hence may be underestimating the benefits of the project.
	35	2209	Irvington BART Infill Station	X		Due to the project's smaller size, the travel model may not accurately estimate its benefits relative to the regional scale of the model.
	36	3002	Downtown San Francisco Congestion Pricing			-
	37	2007	San Francisco Southeast Waterfront Transit Improvements	X	X	Travel Model 1.5 has limitations in representing the distinction between types of bicycle facilities, and so may be underestimating the benefits of streetscape improvements that are in the scope of this project. This project evaluation may be affected by the transit reliability limitation discussed in the first section of the Confidence Assessment.

Horizon/Plan Bay Area 2050: Final Project Performance Findings  
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Project Type	Row ID	Project ID	Project	Travel Model Accuracy	Framework Completeness	Comments
	38	2100	San Pablo BRT		X	This project evaluation may be affected by the transit reliability limitation discussed in the first section of the Confidence Assessment.
	39	2008	Alameda Point Transit Network Improvements		X	This project evaluation may be affected by the transit reliability limitation discussed in the first section of the Confidence Assessment.

Horizon/Plan Bay Area 2050: Final Project Performance Findings  
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Project Type	Row ID	Project ID	Project	Travel Model Accuracy	Framework Completeness	Comments
	40	2000	AC Transit Local Network: Service Increase			-
	41	2101	Geary BRT (Phase 2)	X	X	The travel model does not take into account the 50% discounted Muni Lifeline pass for low income residents. Integrating this program may improve the equity score for the project. This project evaluation may be affected by the transit reliability limitation discussed in the first section of the Confidence Assessment.
	42	2105	Alameda County E14th St/Mission and Fremont Blvd Multimodal Corridor	X	X	Travel Model 1.5 has limitations in representing the distinction between types of bicycle facilities, and so may be underestimating the benefits of streetscape improvements that are in the scope of this project. This project evaluation may be affected by the transit reliability limitation discussed in the first section of the Confidence Assessment.
	43	2103	SamTrans El Camino Real BRT: Capital and Service Improvements		X	This project evaluation may be affected by the transit reliability limitation discussed in the first section of the Confidence Assessment.
	44	2003	Muni Forward: Capital Improvements + Service Increase	X	X	The travel model does not take into account the 50% discounted Muni Lifeline pass for low income residents. Integrating this program may improve the equity score for the project. This project evaluation may be affected by the transit reliability limitation discussed in the first section of the Confidence Assessment.
	45	6100	Integrated Transit Fare System	X		While the evaluation captures increase in ridership due to lower overall fares, it does not take into account the potential increase in ridership from simplifying the existing complex fare system, and hence may be underestimating the benefits of the project.
	46	2004	Sonoma Countywide Bus: Service Increase			-
	47	2400	Downtown San Jose LRT Subway		X	This project evaluation may be affected by the transit reliability and grade separation limitations discussed in the first section of the Confidence Assessment.
	48	6106	Free Transit for Low-Income Households			-
	49	6101	Free Transit for All			-

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Project Type	Row ID	Project ID	Project	Travel Model Accuracy	Framework Completeness	Comments
Build Local Transit	50	4000	Oakland/Alameda Gondola Network	X		Since mode coefficients based on travel survey data are not available for new modes such as gondolas, they must be represented by existing modes in the Travel Model. This gondola network was represented as LRT, given the fixed guideway. This may not capture different perceptions of users (for example, related to safety) that may result in different travel preferences.
	51	4001	Mountain View AV Network (Free Fare, Subsidies from Companies)	X		Since mode coefficients based on travel survey data are not available for new modes such as AVs, they must be represented by existing modes in the Travel Model. This AV network was represented as LRT, given the fixed guideway and grade separation. This may not capture different perceptions of users (for example, related to safety) that may result in different travel preferences.
	52	2403	Vasona LRT Extension (Phase 2)			-
	53	2412	SR-85 LRT (Mountain View to US101 interchange)			-
	54	2408	Muni Metro T-Third Extension to South San Francisco	X		The travel model does not take into account the 50% discounted Muni Lifeline pass for low income residents. Integrating this program may improve the equity score for the project.
	55	4002	Contra Costa Autonomous Shuttle Program	X		Since mode coefficients based on travel survey data are not available for new modes such as AVs, they must be represented by existing modes in the Travel Model. The AV shuttles were represented as buses given they travel in mixed-flow traffic. This may not capture different perceptions of users (for example, related to safety) that may result in different travel preferences.
	56	4003	Cupertino-Mountain View-San Jose Elevated Maglev Rail Loop			-
	57	2402	San Jose Airport People Mover			-

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Project Type	Row ID	Project ID	Project	Travel Model Accuracy	Framework Completeness	Comments
Enhance Alternate Modes	58	2600	WETA Ferry Service Frequency Increase			-
	59	6006	Enhanced Regionwide Bike Infrastructure	X		Travel Model 1.5 has limitations in representing the distinction between types of bicycle facilities and also the use of bicycle to connect to transit. This project evaluation was supported by literature review. The bicycle mode choice constants, which aggregate a number of descriptors of the attractiveness of that mode, were increased to make bicycling slightly more attractive, based on research on the relationship between density of miles of bike infrastructure per square mile and bicycle commute mode share at the city level. Researchers found that a 1 point increase in miles of bike infrastructure (Class I bike path, Class II bike lane or Class IV protected bike lane) per square miles of city land area was correlated with a 1 percentage point increase in bicycle commute mode share. The mode choice constant was increased to result in a 3.7 percentage point increase in cycling, based on a change in miles of infrastructure density that could be afforded by this project. The project benefits then represent the impact of this modeshare shift on users and the transportation system.
	60	2602	WETA Ferry Service: Berkeley - San Francisco	X		Due to the project's smaller size, the travel model may not accurately estimate its benefits relative to the regional scale of the model.
	61	2700	Bay Bridge West Span Bike Path	X	X	Travel Model 1.5 has limitations in representing the distinction between types of bicycle facilities. Despite this, the project was evaluated since it opens up a major link in bicycle facilities, but the evaluation may not capture the full benefit of a protected facility. Further, analysis is performed for a typical weekday, but many of the project's benefits may be accrued on weekends due to recreational use and tourism.
	62	2603	WETA Ferry Service: Redwood City - San Francisco - Oakland	X		Due to the project's smaller size, the travel model may not accurately estimate its benefits relative to the regional scale of the model.

Horizon/Plan Bay Area 2050: Final Project Performance Findings  
 Attachment F: Confidence Assessment - Project-Specific Considerations

This section of the Confidence Assessment comments on limitations of project performance evaluation across two criteria: Travel Model Accuracy and Framework Completeness. If a criterion is marked X, see comments to the right. Row IDs correspond to Attachment A.

Project Type	Row ID	Project ID	Project	Travel Model Accuracy	Framework Completeness	Comments
	63	4004	Regional Hovercraft Network	X		Since mode coefficients based on travel survey data are not available for new modes such as hovercraft, they must be represented by existing modes in the Travel Model. Hovercrafts were represented as ferries. This may not capture different perceptions of users (for example, related to safety) that may result in different travel preferences.
	64	6004	Bay Trail Completion	X		Travel Model 1.5 has limitations in representing the distinction between types of bicycle facilities. Hence, this project was not evaluated on its own, but instead as part of the "Enhanced Regionwide Bike Infrastructure" project.
	65	6005	Regional Bicycle Superhighway Network	X		Travel Model 1.5 has limitations in representing the distinction between types of bicycle facilities. Hence, this project was not evaluated on its own, but instead as part of the "Enhanced Regionwide Bike Infrastructure" project.
<b>Build Road Capacity - High Cost</b>	66	1001	Southern Crossing Bridge + New San Francisco-Oakland Transbay Rail Crossing - BART (Crossing 6)		X	The analysis does not capture the benefits of providing redundancy in the San Francisco-Oakland Transbay Corridor.
	67	3000	Regional Express Lanes (MTC + VTA + ACTC + US-101)	X		The travel model has difficulty representing the benefits of an operational strategy that relies on real-time price changes throughout the morning and evening commute periods. Fixed toll values were determined for each segment/direction of the express lanes for each different time period in the model by calibrating the tolls to achieve a desired speed of 45mph.
	68	1005	Mid-Bay Bridge (I-238 to I-380) (Crossing 2)		X	The analysis does not capture the benefits of providing redundancy in the San Francisco-Oakland Transbay Corridor.
	69	1006	San Mateo Bridge Reconstruction and Widening (Crossing 1)			-
<b>Build Road Capacity - Low Cost</b>	70	3101	I-680/SR-4 Interchange Improvements (Direct/HOV Connectors, Ramp Widening, Auxiliary Lanes)	X		The model does not explicitly represent weaving (thus ignoring the benefits of longer weaving sections) or acceleration or deceleration behavior. Further, while the model is able to represent the increase in travel time due to high traffic volumes on any given road link, it does not explicitly represent queue spillback.
	71	3110	Union City-Fremont East-West Connector	X		Due to the project's smaller size, the travel model may not accurately estimate its benefits relative to the regional scale of the model.
	72	3102	SR-4 Operational Improvements	X		The model does not explicitly represent weaving (thus ignoring the benefits of longer weaving sections) or acceleration or deceleration behavior. Further, while the model is able to represent the increase in travel time due to high traffic volumes on any given road link, it does not explicitly represent queue spillback.

Horizon/Plan Bay Area 2050: Final Project Performance Findings  
 Attachment F: Confidence Assessment - Project-Specific Considerations

This section of the Confidence Assessment comments on limitations of project performance evaluation across two criteria: Travel Model Accuracy and Framework Completeness. If a criterion is marked X, see comments to the right. Row IDs correspond to Attachment A.

Project Type	Row ID	Project ID	Project	Travel Model Accuracy	Framework Completeness	Comments
	73	3104	I-80/I-680/SR-12 Interchange + Widening (Phases 2B-7)	X		The model does not explicitly represent weaving (thus ignoring the benefits of longer weaving sections) or acceleration or deceleration behavior. Further, while the model is able to represent the increase in travel time due to high traffic volumes on any given road link, it does not explicitly represent queue spillback.
	74	3103	SR-4 Widening (Brentwood to Discovery Bay)			-
	75	3106	SR-152 Realignment and Tolling	X		The model's ability in estimating freight travel behavior is limited and so it may be underestimating the freight benefits of this project, both in terms of the number of truck trips and the impacts of steep grades on trucks. The modeling assumes that land use is the same with and without the project, potentially over-estimating the travel time savings of this project.
	76	3109	SR-262 Widening and Interchange Improvements	X		While the model is able to represent the increase in travel time due to high traffic volumes on any given road link, it does not explicitly represent queue spillback.
	77	3100	SR-239 Widening (Brentwood to Tracy including Airport Connector)	X		Because the land uses outside of the 9-county Bay Area are not explicitly represented, the model does not fully understand the likely impact of projects located near the boundaries of the planning region. The modeling assumes that land use is the same with and without the project, potentially over-estimating the travel time savings of this project.
	78	3105	SR-12 Widening (I-80 to Rio Vista)	X		Because the land uses outside of the 9-county Bay Area are not explicitly represented, the model does not fully understand the likely impact of projects located near the boundaries of the planning region.

Horizon/Plan Bay Area 2050: Final Project Performance Findings  
Attachment F: Confidence Assessment - Project-Specific Considerations

This section of the Confidence Assessment comments on limitations of project performance evaluation across two criteria: Travel Model Accuracy and Framework Completeness. If a criterion is marked X, see comments to the right. Row IDs correspond to Attachment A.

Project Type	Row ID	Project ID	Project	Travel Model Accuracy	Framework Completeness	Comments
Optimize Existing Freeway Network	79	5000	Bay Area Forward (Phase 1: Freeway Ramp and Arterial Components Only)	X		The model is likely overestimating the benefits of arterial signal coordination in dense, urban environments. The model is likely underestimating the safety benefits of advanced queue-warning and connected vehicles.
	80	6103	Demand-Based Tolling on All Highways with Means-Based Tolls	X		The travel model has difficulty representing the benefits of an operational strategy that relies on real-time price changes. Fixed toll values were determined for each segment/direction of all lanes for each different time period in the model by calibrating the tolls to achieve a desired speed of 45mph.
	81	6102	HOV Lane Network with per-mile fee for SOVs			-
	82	3003	San Francisco Arterial HOV and Freeway HOT Lanes	X		The travel model has difficulty representing the benefits of an operational strategy that relies on real-time price changes throughout the morning and evening commute periods. Fixed toll values were determined for each segment/direction of the express lanes for each different time period in the model by calibrating the tolls to achieve a desired speed of 45mph.
	83	2002	AC Transit Transbay Network: Capital Improvements + Service Increase		X	This project evaluation may be affected by the transit reliability limitation discussed in the first section of the Confidence Assessment.
	84	6022	Bus Rapid Transit (BRT) on All Bridges: Dedicated Lanes + Service/Capacity Improvements		X	This project evaluation may be affected by the transit reliability limitation discussed in the first section of the Confidence Assessment.
	85	6020	Regional Express (ReX) Bus Network + Optimized Express Lane Network	X		The ReX express bus network was represented with mode choice coefficients used for existing express buses. However, given that ReX Express Routes in particular are designed to be "train-like" through the use higher quality and more attractive infrastructure, the project benefits may be underestimated.
	86	5003	I-680 Corridor Improvements (BRT, Express Bus, Shared AVs, Gondolas)	X		Since mode coefficients based on travel survey data are not available for new modes such as gondolas and AVs, they must be represented by existing modes in the Travel Model. The gondola network was represented as LRT given the fixed guideway, and the AV shuttles were represented as buses given they travel in mixed-flow traffic. This may not capture different perceptions of users (for example, related to safety) that may result in different travel preferences.
	87	6104	Reversible Lanes on Top 10 Congested Bridges and Freeways			-

Horizon/Plan Bay Area 2050: Final Project Performance Findings  
 Attachment F: Confidence Assessment - Project-Specific Considerations

This section of the Confidence Assessment comments on limitations of project performance evaluation across two criteria: Travel Model Accuracy and Framework Completeness. If a criterion is marked X, see comments to the right. Row IDs correspond to Attachment A.

Project Type	Row ID	Project ID	Project	Travel Model Accuracy	Framework Completeness	Comments
	88	6003	I-80 Corridor Overhaul with Per-Mile Tolling	X	X	While the model is able to represent the increase in travel time due to high traffic volumes on any given road link, it does not explicitly represent queue spillback. This project evaluation may be affected by the transit reliability limitation discussed in the first section of the Confidence Assessment.
	89	6021	Bus Rapid Transit (BRT) on All Bridges: Dedicated Lanes only		X	This project evaluation may be affected by the transit reliability limitation discussed in the first section of the Confidence Assessment.
	90	6105	Timing Regulation of Freight Delivery	X		The model's ability in estimating freight travel behavior and its interaction with the freeway network is limited, and hence this project was not evaluated given its focus on freight.
<b>Resilience</b>	91	7002	I-580/US-101/SMART Marin Resilience Project		X	The project benefits are estimated relative to a baseline without the transportation asset. As such, the benefits may be overestimated since flooding may not occur until later in the analysis period.
	92	7005	SR-237 Resilience Project (Alviso)		X	The project benefits are estimated relative to a baseline without the transportation asset. As such, the benefits may be overestimated since flooding may not occur until later in the analysis period.
	93	7006	I-880 Resilience Project (South Fremont)		X	The project benefits are estimated relative to a baseline without the transportation asset. As such, the benefits may be overestimated since flooding may not occur until later in the analysis period.
	94	7004	SR-84 Resilience Project (Dumbarton Bridge, 101 Interchange)		X	The project benefits are estimated relative to a baseline without the transportation asset. As such, the benefits may be overestimated since flooding may not occur until later in the analysis period.
	95	7003	US-101 Peninsula Resilience Project (San Antonio Rd, Poplar Ave, Millbrae Ave)		X	The project benefits are estimated relative to a baseline without the transportation asset. As such, the benefits may be overestimated since flooding may not occur until later in the analysis period.
	96	7001	VTA LRT Resilience Project (Tasman West)		X	The project benefits are estimated relative to a baseline without the transportation asset. As such, the benefits may be overestimated since flooding may not occur until later in the analysis period.
	97	3200	SR-37 Long Term Project (Tolling, Elevation, Interchanges, Widening, Express Bus)	X	X	While the model is able to represent the increase in travel time due to high traffic volumes on any given road link, it does not explicitly represent queue spillback. Further, the project benefits are estimated relative to a baseline without the transportation asset. As such, the benefits may be overestimated since flooding may not occur until later in the analysis period.

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Recommended Amendment Proposed by  
President WallaceStaff Report 20-270  
Att.1.**DRAFT**

July x, 2020

Therese McMillan  
Executive Director  
Metropolitan Transportation Commission  
375 Beale St.  
San Francisco, CA 94105

RE: Blueprint for Plan Bay Area 2050 Commitment Letter

Dear Ms. McMillan:

The Alameda-Contra Costa Transit District is pleased to reiterate its commitment to the Blueprint project planning process for Plan Bay Area 2050 and appreciates the opportunity to participate in this important process. This Commitment Letter outlines the ways in which AC Transit plans to respond to MTC's concerns about the East Bay Rapid and Transbay Projects.

The MTC Blueprint represents the specific bus, ferry, rail, and road projects to be included in Plan Bay Area 2050. AC Transit submitted several projects to MTC for review under Blueprint, and all but two were carried forward into the Blueprint after initial screening. Cost-benefit concerns were indicated for the East Bay Rapid Project and equity concerns were noted for Transbay service. AC Transit plans to address each of these concerns.

The East Bay Rapid Project was designed to implement portions of AC Transit's 2016 Major Corridors study. To improve the project's cost-benefit, some of the less productive lines can be deferred until their prospects improve, and AC Transit will consider removing the Adeline corridor which has the lowest productivity. The District will also investigate lowering the cost of lines which will remain in the project. To that end, an early value engineering-type review will be conducted. Some amenities may be deferred for later implementation provided that a funding strategy is developed.

We will also address MTC's concerns about equity with regard to the Transbay Service Project. MTC noted that Transbay passengers were generally higher income than other Bay Area transit passengers. AC Transit will analyze and, if feasible, implement additional Transbay lines originating in low-income East Bay neighborhoods. This should attract passengers with lower incomes than existing riders.

To improve fare equity, some transit agencies support means-based fares and coordinated interagency fares in their commitment letters. The AC Transit Board of Directors wishes to join other Bay Area transit agencies in participating in the Clipper START means-based fare program at the 20% fare reduction level, similar to BART and Caltrain. The AC Transit Board believes this is a worthwhile effort that will benefit our low-income passengers. However, we remain but has concerns eds about the loss of

Recommended Amendment Proposed by  
President Wallace

Staff Report 20-270  
Att.1.

July x, 2020  
Page 2

**DRAFT**

substantial farebox revenue given that AC Transit has the highest proportion of low-income passengers among major Bay Area transit agencies—close to 70%. These concerns are reinforced by the uncertainties of the COVID-19 pandemic and recovery periods. ~~AC Transit's largest single type of revenue is sales tax, which has dropped sharply during the pandemic, and we cannot afford to lose both fare and sales tax revenue. Lost revenue which forces cuts in service would not benefit our low-income riders. The AC Transit Board hopes -A\_ that priority will be given to identifying a~~ dedicated and sustainable revenue source ~~needs to be identified\_~~ to make means-based fares a permanent reality.

AC Transit is committed to refining flagged projects and we thank MTC for inclusion of all of the District's submitted projects into the Blueprint. We look forward to our continued partnership with MTC on Plan Bay Area 2050.

Sincerely

Michael A. Hursh  
General Manager

cc: Board of Directors

<b>DATE:</b>	July 16, 2020
<b>TO:</b>	Alameda County Transportation Commission
<b>FROM:</b>	Carolyn Clevenger, Deputy Executive Director of Planning and Policy Kristen Villanueva, Senior Transportation Planner
<b>SUBJECT:</b>	Approve Updated Plan Bay Area 2050 Project List and Performance Strategies for Alameda County for Submittal to the Metropolitan Transportation Commission

### Recommendation

It is recommended that the Commission approve the revised Alameda County project list and performance strategies for submittal to the Metropolitan Transportation Commission (MTC) for purposes of developing the region's transportation plan, Plan Bay Area 2050 (PBA 2050). Upon approval, the list and associated details will be sent to MTC. This is an action item.

### Summary

Development of PBA 2050 has been underway since early 2018 and is approaching a critical milestone of approval by MTC in July 2020 of the Draft Transportation Element of the Plan. The region's County Transportation Agencies (CTAs) are required to submit final updated project lists for inclusion in the Draft Plan. Attachment A is the Final Project List proposed for your approval. The project list must address the following:

- Include project costs that fit within a constrained county budget for two time-periods, 2020 to 2035 and 2036 to 2050.
- Include Commitment Letters for each major project that MTC has designated as having performance issues on either benefit-cost or a qualitative score.

### Project List

In March, the Alameda CTC Commission approved a draft final project list (Attachment B, Spring 2020 project list) and strategies to address performance concerns raised by MTC during their project performance assessment for submittal to MTC. The information was developed in close consultation with partner agencies and project sponsors. The Spring 2020 project list identified the time horizon for project implementation for each project, and included requests for regional discretionary funding and assigned county

discretionary funding across the projects. MTC has reviewed the information submitted and will be making final recommendations to the MTC Commission for approval in July.

MTC released staff recommendations the first week of July. The Planning, Policy and Legislation Committee received a verbal overview of key issues at its July meeting. Alameda CTC staff has reviewed the material and worked closely with project sponsors and MTC staff to refine recommendations for a Final Project List and performance strategies for Commission approval at your July meeting.

The Final Project List will include regionally-significant projects as well as smaller local projects and programmatic categories. Each project or program will have a time period assigned, either 2021-2035, or 2036-2050, as well as MTC's regional discretionary funding assignments and county discretionary funding assignments. The total project list must be financially constrained based on MTC's financial projections for PBA 2050. Due to financial constraint and project performance issues raised by MTC, some projects have been phased or had project scopes modified, with only early phases included in the updated project list..

#### Project Performance

MTC is also requiring all CTA Boards to identify how any performance issues MTC identified as part of its project assessment will be addressed if projects are requesting regional discretionary funding. In March, the Commission discussed potential strategies to address MTC's performance concerns. Attachment C details MTC's performance results for the major projects in Alameda County that were identified by MTC as having performance shortcomings and the details strategies to address those concerns. For those projects where Alameda CTC is listed as the project sponsor, the Alameda CTC Commission must approve the proposed strategies. Where other agencies are listed as the project sponsor, the project sponsors are submitting their responses directly to MTC and it is included here for your information. Please note some of the responses may be revised as discussions with MTC continue and project sponsors finalize their submittals to MTC and secure the approval of their respective governing boards.

#### **Background**

MTC and ABAG have been working on developing a long-range plan for the region since early 2018. Federal requirements stipulate that a region's long-range transportation plan must include a list of transportation projects and investment categories for the next 30 years and be fiscally constrained. To develop this list, Alameda CTC and our partner agencies have submitted projects via a number of different calls for projects to MTC for consideration. In July 2020, MTC will approve a final list of projects and programs for inclusion in the Draft PBA 2050 that will then undergo an environmental review process. The Alameda CTC Commission has approved three sets of submittals for consideration for PBA 2050 thus far, one in May 2018 for "transformative projects", one in June 2019 for regionally-significant projects, and a draft final project list with county funding assignments in March 2020. We are now at the point in the process to submit the final county project list of fiscally-constrained investments and project schedules.

### **PBA 2050 Performance Assessment**

A project performance assessment was performed on projects with project costs of over \$250 million. Projects were scored for benefit cost, equity, and guiding principles developed for the Plan and incorporates results from the three different futures. MTC is requiring project sponsors with projects that had significant performance issues identified through MTC's performance assessment provide Performance Commitments approved by the project sponsor's governing boards in order to be considered for inclusion in PBA 2050. Projects fully funded with local funds are exempted from this requirement.

Attachment C details projects in Alameda County that were flagged by MTC as having performance shortcomings. The list includes projects for which Alameda CTC is the project sponsor, as well as projects with either local agencies, multi-county transit agencies, or MTC serving as project sponsors. Attachment C details the responses project sponsors are submitting to MTC, and identifies Alameda CTC's proposed approach for those projects for which we are the project sponsor. These commitments and project revisions will be submitted formally to MTC in July with your approval of this item.

For Express Lanes projects, MTC serves as the project sponsor for the Bay Area regional express lanes. MTC worked closely with other CTAs that are operating or developing express lanes throughout the region to develop one Regional Express Lanes project for PBA 2050 and one joint project commitment letter (Attachment D). This commitment letter will be signed by all parties working collaboratively on express lanes throughout the region. It is anticipated that throughout August and September additional revisions will occur on the regional express lanes program, pending additional discussion with MTC and other CTAs.

### **Final Updated Project List for PBA 2050**

MTC is requiring a final fiscally constrained list of projects and programs from CTAs for consideration in PBA 2050 by the end of July. This list must include regionally-significant and local projects, and identify county budget assignments for two time periods, 2020-2035 and 2036-2050, which coincide with state mandated greenhouse gas emissions reductions timelines.

This will be the first time MTC requires funding constraint by time period. This may result in projects being pushed to later years in order to have PBA 2050 meet the financial constraint requirement, which is a federal requirement of all regional transportation plans once MTC determines what level of regionally discretionary funding projects can assume. Staff are awaiting MTC's recommendations and final actions regarding the time period for projects and will update the Commission at the July Commission meeting.

MTC provided a budget for Alameda County of \$3.7 billion in the first 15 years, and \$5 billion in the second 15 years. These funds include anticipated Measure BB, county shares of Transportation Fund for Clean Air and Vehicle Registration Fees, as well as an estimate of future federal Congestion Mitigation and Air Quality and State Transportation Planning

funds (CMAQ/STP) that have historically come to the counties as part of the One Bay Area Grant program. MTC expects CTAs to assign these funds primarily to “programmatic categories”, which are bundles of local projects. The rest can be put toward regionally significant projects, which are typically funded by a mix of regional, state, and federal funds. **It is important to note that this exercise is for long-range planning purposes only and in no way indicates a future funding commitment to any project.**

MTC released recommendations for how to assign regional discretionary funding (including funds such as Regional Measure 3, SB 1 competitive funding programs, federal programs, etc.) both to projects as well as strategies that MTC is testing as part of the Draft Blueprint in early July. Alameda CTC staff has worked extensively with project sponsors and MTC staff to develop the updated Final Project List to reflect MTC’s recommended regional funding assignments and project schedules.

#### **Next Steps**

Upon Commission approval of a Final Project List (Attachment A) and project performance strategies (Attachments C and D), staff will submit a package to MTC by July 31, 2020.

**Fiscal Impact:** There is no fiscal impact for this item associated with the requested action.

#### **Attachments:**

- A. Final Project List
- B. Spring 2020 project list
- C. Approach to Address Performance Shortcomings for PBA 2050
- D. Bay Area Express Lane PBA 2050 Commitment Letter

## 10.1A

## Attachment A. Final Project List

\*Next to project denotes that MTC recommended no regional discretionary funding for the project and Alameda CTC is continuing to request regional discretionary funding for those projects.

Row	Project	Source/Sponsor	Cost (\$ in millions, Year of Expenditure)
<b>Alameda County Programmatic Categories</b>			
1	<b>Active Transportation and Vision Zero</b> Projects in this category are new bicycle and pedestrian facilities, facilities that connect existing network gaps, and safety strategies such as Vision Zero	Alameda CTC	\$ 1,861
2	<b>Goods Movement and Rail Safety</b> This program includes projects that improve freight operations and reduce impacts of freight activity such as projects that support the Port of Oakland, emissions reductions, rail safety, and other freight-related impacts and improvements.	Alameda CTC	\$ 1,500
3	<b>Multimodal Corridors*</b> This program includes projects that transform roadways into multimodal corridors with facilities for walking, biking, and improved bus travel.	Alameda CTC	\$ 825
4	<b>Local and Regional Road Safety</b> This program includes projects that improve local circulation and address road safety along local routes, regional routes and interchanges. This includes multimodal and operational upgrades to interchanges that minimally change capacity.	Alameda CTC	\$ 400
5	<b>Technology</b> This category includes projects that improve roadway, intersection, or interchange operations, ITS, as well as other transportation system management. Projects also implement technology upgrades for transit including microtransit.	Alameda CTC	\$ 277
6	<b>Urban Greenways and Trails*</b> Projects in this category are new off street bicycle and pedestrian facilities and projects that close gaps or address barriers in the active transportation network. This category includes new segments of Bay Trail, Iron Horse Trail, extensions of East Bay Greenway and new trails such as Niles Canyon, Sabercat, San Lorenzo Creek, Dumbarton/Quarry Lakes, and San Leandro Creek trail.	Alameda CTC	\$ 1,116
7	<b>Local Transit Access, Service and Fares</b> Projects in this category improve station access, bus stop access, upgrades to BART systems. It also includes free transit pilot projects, fare integration and affordability through the Student Transit Pass Program, minor service expansions for LAVTA and AC Transit along major corridors, and other transit planning and service innovations.	Alameda CTC	\$ 1,400
8	<b>Climate Program: TDM and Emission Reduction Technology</b> Projects in this category implement strategies and programs that reduce emissions, encourage alternative transportation modes, and manage transportation demand including but not limited to projects such as TDM program implementation, parking management, local area shuttle and paratransit services	Alameda CTC	\$ 130
9	<b>Planning</b> This category includes planning studies supporting the regional PDA framework and connecting transportation and land use.	Alameda CTC	\$ 50
	<b>County Budget 2020-2035</b>	\$1,600	
	<b>County Budget 2036-2050</b>	\$3,700	
	<b>Regional Request 2020-2050</b>	\$2,400	
	<b>TOTAL</b>	\$7,700	
<b>Alameda County Regionally-Significant Projects</b>			
<b>680/580 Work Program</b>			
10	I-680 Express Lanes: SR-84 to Alcosta Phase 1 (Southbound)	Alameda CTC	\$ 252
11	I-680 Express Lanes: SR-84 to Alcosta Phase 2 (Northbound)	Alameda CTC	\$ 228
12	I-680 Express Bus to Silicon Valley*	Alameda CTC	\$ 170
13	I-680 Express Lanes (NB): SR-84 to Automall Pkwy Phase 1	Alameda CTC	\$ 236
14	I-680 Express Lanes (NB): Automall Pkwy to SC County Line Phase 2	Alameda CTC	\$ 130
15	I-580 Design Alternatives Assessments (DAAs) Implementation	Alameda CTC	\$ 300
16	I-580/680 Interchange Scoping	Alameda CTC	\$ 20
17	SR-262 Safety and Interchange Improvements - Phase 1	Alameda CTC	\$ 445

## Attachment A. Final Project List

\*Next to project denotes that MTC recommended no regional discretionary funding for the project and Alameda CTC is continuing to request regional discretionary funding for those projects.

Row	Project	Source/Sponsor	Cost (\$ in millions, Year of Expenditure)
<b>Regional Transit</b>			
18	South Bay Connect	CCJPA	\$ 264
19	Bay Fair Connection	BART	\$ 150
20	Station Modernization Program	BART	\$ 200
21	Hayward Maintenance Complex (HMC) Phase 1	BART	\$ 209
22	San Pablo BRT/Multimodal Corridor	AC Transit	\$ 300
23	Irvington BART Infill Station	Alameda CTC	\$ 180
24	Alameda Point Transit Network Improvements	Alameda CTC	\$ 500
25	Alameda County E14th/Mission and Fremont Blvd. Multimodal Corridor	Alameda CTC	\$ 330
26	Bay Bridge Forward	MTC	\$ 103
<b>Interchanges (non-exempt)</b>			
27	I-580 Interchange Imps at Hacienda/Fallon Rd, Ph 2	City of Dublin	\$ 58
28	Rt 92/Clawiter/Whitesell Interchange Improvements	City of Hayward	\$ 40
29	42nd Ave. & High St. I-880 Access Improv.	City of Oakland	\$ 18
30	I-880/Whipple Rd Industrial Pkwy SW I/C Imps	Alameda CTC	\$ 220
31	I-880 Winton Avenue A Street Interchange Reconstruction	Alameda CTC	\$ 176
32	Oakland/Alameda Access Project	Alameda CTC	\$ 115
33	I-580/Santa Rita Overcrossing Widening	City of Pleasanton	\$ 49
34	I-680/Stoneridge Drive Overcrossing Widening	City of Pleasanton	\$ 44
<b>Goods Movement</b>			
35	Oakland Army Base Infrastructure Improvements	City of Oakland	\$ 301
36	7th Street Grade Separation East	Alameda CTC	\$ 317
37	7th Street Grade Separation West	Alameda CTC	\$ 311
<b>Active Transportation and Complete Streets</b>			
38	East Bay Greenway*	Alameda CTC	\$ 250
39	Central Avenue Safety Improvements	City of Alameda	\$ 15
40	Alameda County Complete Streets Road Diets	Alameda CTC	\$ 100
<b>Other Roadway and Major Projects</b>			
41	Quarry Lakes Parkway - Union City portion*	Union City	\$ 288
42	Fremont Decoto Road Complete Streets Project	Fremont	\$ 20
43	Dublin Boulevard North Canyons Parkway Complete Streets Extension*	City of Dublin	\$ 166
44	Dougherty Road Widening	City of Dublin	\$ 23
45	Tassajara Road Widening from N. Dublin Ranch Drive to City Limit	City of Dublin	\$ 23
46	Dublin Boulevard widening	City of Dublin	\$ 7
47	Auto Mall Parkway Improvements Near I-680	City of Fremont	\$ 50
48	Extension of El Charro Road from Stoneridge Drive to Stanley Blvd	City of Pleasanton	\$ 137
49	Union City Boulevard Widening (Whipple to City Limit)	Union City	\$ 17
<b>Projects in construction and to be shown in the Plan and TIP</b>			
50	Rte 84 Widening, south of Ruby Hill Dr to I-680	Alameda CTC	
51	SR 84 Expressway Widening	Alameda CTC	
54	Telegraph Avenue Road Diet	City of Oakland	
55	SR 84 Expressway Widening	Alameda CTC	
56	New Alameda Point Ferry Terminal	City of Alameda	
57	AC Transit: East Bay Bus Rapid Transit	AC Transit	
58	Shattuck Complete Streets and De-couplet	City of Berkeley	
59	Oakland: Telegraph Ave Bike/Ped Imps and Road Diet	City of Oakland	
60	Oakland: Telegraph Avenue Complete Streets	City of Oakland	
61	Oakland Fruitvale Ave Bike/Ped Imprvmnts H8-04-014	City of Oakland	
		<b>County Budget 2020-2035</b>	<b>\$1,600</b>
		<b>County Budget 2036-2050</b>	<b>\$900</b>
		<b>Regional Request 2020-2050</b>	<b>\$2,700</b>
		<b>TOTAL</b>	<b>\$5,200</b>

## Attachment A. Final Project List

\*Next to project denotes that MTC recommended no regional discretionary funding for the project and Alameda CTC is continuing to request regional discretionary funding for those projects.

Row	Project	Source/Sponsor	Cost (\$ in millions, Year of Expenditure)
<b>Regional Transit Projects Supported by Alameda CTC.</b> Projects largely funded by regional discretionary funding with county and/or transit agency contributions. Projects with county funding assigned shown in <b>bold</b> .			
Bus	<b>AC Transit Local Network: Service Increase</b>	AC Transit	\$ 2,600
	<b>AC Transit Local Rapid Network: Capital Improvements+Service Increase</b>	AC Transit	\$ 6,400
	AC Transit Transbay Network: Capital Improvements + Service Increase	AC Transit	\$ 229
	<b>AC Transit Service Increases to Newark and Fremont PDAs</b>	AC Transit	\$ 95
Rail	<b>BART Core Capacity</b>	BART	\$ 5,700
	<b>ACE Rail Service Increase (10 Daily Roundtrips)</b>	SJRRRC	\$ 1,300
	<b>Valley Link (Dublin to San Joaquin Valley)</b>	TVSJVRRRA	\$ 3,000
	Dumbarton Rail Group Rapid Transit (Redwood City to Union City)	SamTrans C/CAG	\$ 3,900
	New San Francisco-Oakland Transbay Rail Crossing (4 alternatives)	MTC/ABAG	Varies
Ferry	WETA Ferry Service Frequency Increase	WETA	\$ 575
	WETA Ferry Service: Berkeley-San Francisco	WETA	\$ 200
	<b>County Budget 2020-2035</b>	<b>\$639</b>	
	<b>County Budget 2036-2050</b>	<b>\$56</b>	
	<b>Regional Request 2020-2050</b>	<b>TBD: Operators to Request from MTC</b>	

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## Attachment B. Spring 2020 Project List

Row	Project	Source/Sponsor	Cost (\$ in millions)
<b>Alameda County Programmatic Categories</b>			
1	<b>Active Transportation and Vision Zero</b> Projects in this category are new bicycle and pedestrian facilities, facilities that connect existing network gaps, and safety strategies such as Vision Zero	Alameda CTC	\$ 2,200
2	<b>Goods Movement and Rail Safety</b> This program includes projects that improve freight operations and reduce impacts of freight activity such as projects that support the Port of Oakland, emissions reductions, rail safety, and other freight-related impacts and improvements.	Alameda CTC	\$ 1,500
3	<b>Multimodal Corridor</b> This program includes projects that transform roadways into multimodal corridors with facilities for walking, biking, and improved bus travel.	Alameda CTC	\$ 625
4	<b>Local and Regional Road Safety</b> This program includes projects that improve local circulation and address road safety along local routes, regional routes and interchanges. This includes multimodal and operational upgrades to interchanges that minimally change capacity.	Alameda CTC	\$ 300
5	<b>Technology</b> This category includes projects that improve roadway, intersection, or interchange operations, ITS, as well as other transportation system management. Projects also implement technology upgrades for transit including microtransit.	Alameda CTC	\$ 400
6	<b>Urban Greenways and Trails</b> Projects in this category are new off street bicycle and pedestrian facilities and projects that close gaps or address barriers in the active transportation network. This category includes new segments of Bay Trail, Iron Horse Trail, extensions of East Bay Greenway and new trails such as Niles Canyon, Sabercat, San Lorenzo Creek, Dumbarton/Quarry Lakes, and San Leandro Creek trail.	Alameda CTC	\$ 1,200
7	<b>Local Transit Access, Service and Fares</b> Projects in this category improve station access, bus stop access, upgrades to BART systems. It also includes free transit pilot projects, fare integration and affordability through the Student Transit Pass Program, minor service expansions for LAVTA and AC Transit along major corridors, and other transit planning and service innovations.	Alameda CTC	\$ 1,400
8	<b>Climate Program: TDM and Emission Reduction Technology</b> Projects in this category implement strategies and programs that reduce emissions, encourage alternative transportation modes, and manage transportation demand including but not limited to projects such as TDM program implementation, parking management, local area shuttle and paratransit services	Alameda CTC	\$ 130
9	<b>Planning</b> This category includes planning studies supporting the regional PDA framework and connecting transportation and land use.	Alameda CTC	\$ 50
	<b>County Budget 2020-2035</b>	\$1,600	
	<b>County Budget 2036-2050</b>	\$2,300	
	<b>Regional Request 2020-2050</b>	\$4,000	
	<b>TOTAL</b>	\$7,900	
<b>Alameda County Regionally-Significant Projects</b>			
<b>680/580 Work Program</b>			
10	I-680 Express Lanes: SR-84 to Alcosta Phase 1 (Southbound)	Alameda CTC	\$ 252
11	I-680 Express Lanes: SR-84 to Alcosta Phase 2 (Northbound)	Alameda CTC	\$ 228
12	I-680 Express Bus to Silicon Valley	Alameda CTC	\$ 170
13	I-680 Express Lanes (NB): SR-84 to Automall Pkwy Phase 1	Alameda CTC	\$ 236
14	I-680 Express Lanes (NB): Automall Pkwy to SC County Line Phase 2	Alameda CTC	\$ 130
15	I-580 Design Alternatives Assessments (DAAs) Implementation	Alameda CTC	\$ 400
16	I-580/680 Interchange HOV/HOT Widening	Alameda CTC	\$ 1,500
17	SR-262 Widening and Interchange Improvements	Alameda CTC	\$ 925

## Attachment A. Spring 2020 Project List

Row	Project	Source/Sponsor	Cost (\$ in millions)
<b>Regional Transit</b>			
18	South Bay Connect	CCJPA	\$ 264
19	Bay Fair Connection	BART	\$ 234
20	Station Modernization Program	BART	\$ 200
21	Hayward Maintenance Complex (HMC) Phase 1	BART	\$ 209
22	San Pablo BRT/Multimodal Corridor	AC Transit	\$ 300
23	Irvington BART Infill Station	Alameda CTC	\$ 180
24	Alameda Point Transit Network Improvements	Alameda CTC	\$ 500
25	Alameda County E14th/Mission and Fremont Blvd. Multimodal Corridor	Alameda CTC	\$ 330
26	Bay Bridge Forward	MTC	\$ 65
<b>Interchanges (non-exempt)</b>			
27	I-580 Interchange Imps at Hacienda/Fallon Rd, Ph 2	City of Dublin	\$ 58
28	Rt 92/Clawiter/Whitesell Interchange Improvements	City of Hayward	\$ 40
29	42nd Ave. & High St. I-880 Access Improv.	City of Oakland	\$ 18
30	I-880/Whipple Rd Industrial Pkwy SW I/C Imps	Alameda CTC	\$ 220
31	I-880 Winton Avenue A Street Interchange Reconstruction	Alameda CTC	\$ 176
32	Oakland/Alameda Access Project	Alameda CTC	\$ 115
33	I-580/Santa Rita Overcrossing Widening	City of Pleasanton	\$ 49
34	I-680/Stoneridge Drive Overcrossing Widening	City of Pleasanton	\$ 44
<b>Goods Movement</b>			
35	Oakland Army Base Infrastructure Improvements	City of Oakland	\$ 301
36	7th Street Grade Separation East	Alameda CTC	\$ 317
37	7th Street Grade Separation West	Alameda CTC	\$ 311
<b>Active Transportation and Complete Streets</b>			
38	East Bay Greenway	Alameda CTC	\$ 250
39	Central Avenue Safety Improvements	City of Alameda	\$ 15
40	Alameda County Complete Streets Road Diets	Alameda CTC	\$ 100
<b>Other Roadway and Major Projects</b>			
41	Union City-Fremont East-West Connector	Union City	\$ 320
42	Dublin Blvd. - North Canyons Pkwy Extension	City of Dublin	\$ 166
43	Dougherty Road Widening	City of Dublin	\$ 23
44	Tassajara Road Widening from N. Dublin Ranch Drive to City Limit	City of Dublin	\$ 23
45	Dublin Boulevard widening	City of Dublin	\$ 7
46	Auto Mall Parkway Improvements Near I-680	City of Fremont	\$ 50
47	Extension of El Charro Road from Stoneridge Drive to Stanley Blvd	City of Pleasanton	\$ 137
48	Union City Boulevard Widening (Whipple to City Limit)	Union City	\$ 17
<b>Committed Projects</b>			
49	Rte 84 Widening, south of Ruby Hill Dr to I-680	Alameda CTC	
50	SR 84 Expressway Widening	Alameda CTC	
51	Dougherty Road Widening	City of Dublin	
52	Dublin Boulevard widening	City of Dublin	
53	Telegraph Avenue Road Diet	City of Oakland	
54	SR 84 Expressway Widening	Alameda CTC	
55	New Alameda Point Ferry Terminal	City of Alameda	
56	AC Transit: East Bay Bus Rapid Transit	AC Transit	
57	Shattuck Complete Streets and De-couplet	City of Berkeley	
58	Oakland: Telegraph Ave Bike/Ped Imps and Road Diet	City of Oakland	
59	Oakland: Telegraph Avenue Complete Streets	City of Oakland	
60	Oakland Fruitvale Ave Bike/Ped Imprvmnts H8-04-014	City of Oakland	
		<b>County Budget 2020-2035</b>	<b>\$1,500</b>
		<b>County Budget 2036-2050</b>	<b>\$1,100</b>
		<b>Regional Request 2020-2050</b>	<b>\$4,700</b>
		<b>TOTAL</b>	<b>\$7,300</b>

## Attachment B. Spring 2020 Project List

Row	Project	Source/Sponsor	Cost (\$ in millions)
<b>Regional Transit Projects Supported by Alameda CTC. Project sponsors are updating costs and funding plans so county budget is reserved here to assign in June.</b>			
Bus	AC Transit Local Network: Service Increase	AC Transit	\$ 2,600
	AC Transit Local Rapid Network: Capital Improvements+Service Increase	AC Transit	\$ 6,400
	AC Transit Transbay Network: Capital Improvements + Service Increase	AC Transit	\$ 6,500
Rail	BART Core Capacity	BART	\$ 4,500
	ACE Rail Service Increase (10 Daily Roundtrips)	SJRRRC	\$ 1,300
	Valley Link (Dublin to San Joaquin Valley)	TVSJVRRRA	\$ 3,000
	Altamont Corridor Vision Phase 1 (to San Joaquin Valley)	TVSJVRRRA, SJRRRC	\$ 4,600
	Dumbarton Rail (Redwood City to Union City)	SamTrans C/CAG	\$ 3,900
	New San Francisco-Oakland Transbay Rail Crossing (4 alternatives)	MTC/ABAG	Varies
Ferry	WETA Ferry Service Frequency Increase	WETA	\$ 400
	WETA Ferry Service: Berkeley-San Francisco	WETA	\$ 200
	WETA Ferry Service: Redwood City-San Francisco- Oakland	WETA	\$ 300
	<b>County Budget 2020-2035</b>	<b>700</b>	
	<b>County Budget 2036-2050</b>	<b>500</b>	
	<b>Regional Request 2020-2050</b>	<b>TBD: Operators to Request from MTC</b>	

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#### Approach to Address Performance Shortcomings for PBA 2050

##### Overview of MTC's performance assessment:

**Benefit-Cost Ratio:** All project impacts are measured against a uniform base transportation and land use network in each future.

**Equity Score:** "Advances" indicates that the project may benefit lower income individuals (below regional median income) more than higher income individuals. "Challenges" indicates that project benefits skew towards higher income individuals. "Even" indicates even distribution of benefits for all income groups.

**Guiding Principle Flags:** Flags, based on qualitative analysis, are intended to draw attention to a direct adverse impact a project may have that may not be captured as part of other assessments. Projects receive one or more flags if it would do any of the following:

- increase travel costs for lower income residents
- significantly increase travel times or eliminate travel options
- displace lower-income residents or divide communities (as a direct impact of project construction)
- significantly increase emissions or collisions
- directly eliminate jobs

Projects have performance issues if one of the following is met:

- Two or more benefit-cost ratios less than one, and/or
- One or more equity scores with a "Challenges" rating, and/or
- One or more Guiding Principles flags

Table B.1 List of Investments Requiring Action

Note: GP is Guiding Principle flag, BC is Benefit-Cost flag, and Equity is the Equity flag

Project Sponsor	Major Project	Performance Flag:			Proposed Path Forward
		GP	BC	Equity	
Overarching issues for Road Projects: MTC's analysis assumes all road projects increase emissions and collisions. SR-262 is assumed to divide a community. MTC tool does not capture benefits of traffic operations projects.					
Alameda CTC	SR-262 Widening and Interchange Improvements	x	x	x	<p>Based on extensive discussions with MTC and the City of Fremont, recommending the project be phased and that only Phase 1, composed of two elements detailed below, be included in PBA2050.</p> <p>1) <b>SR 262 (Mission Boulevard) Cross Connector Local Improvements</b></p> <ul style="list-style-type: none"> <li>• <b>Period 1, 2021-2035 - \$398M:</b> <ul style="list-style-type: none"> <li>o Modernization/Operational Improvements at State Route 262/Interstate 680 Interchange.</li> <li>o Grade Separation of Warm Springs Boulevard and Mohave Drive.</li> </ul> </li> </ul> <p>2) <b>SR 262 (Mission Boulevard) Cross Connector Express Lane Improvements – Study Only</b></p> <ul style="list-style-type: none"> <li>• <b>Period 1, 2021-2035 – \$2M; 100% Locally Funded:</b> Study Express Lane Direct Connectors from Interstate 680 (I-680) to Interstate 880 (I-880) via the SR 262 corridor</li> </ul>
MTC in partnership with CTAs	Regional Express Lanes (MTC + VTA + ACTC + US-101)	x	x	x	The project sponsor is MTC but includes future Alameda CTC lanes along I-680 and I-580. MTC Express Lanes staff led discussions VTA, SFCTA and C/CAG to address the performance issues flagged by MTC. A joint letter (Attachment D) was developed and includes strategies such as phasing to improve the benefit cost, a focus on express lanes that

Project Sponsor	Major Project	Performance Flag:			Proposed Path Forward
		GP	BC	Equity	
					convert general purpose lanes rather than add capacity, support for transit and future roadway tolling, and equity-based toll discounts. This coordinated approach was presented to the MTC Operations Committee in June for consideration.
Union City and City of Fremont	Quarry Lakes Parkway/ Union City-Fremont East-West Connector	x			<p>The project will be split into two projects to better reflect the project development and delivery approach agreed to by Union City and the City of Fremont.</p> <ul style="list-style-type: none"> <li>Union City Quarry Lakes Parkway (Period TBD, \$258 million) – Union City is submitting to MTC strategies to reduce greenhouse gas emissions, focused on the need for the project to support transit oriented development and the project's multimodal elements. More information will be provided as it is available.</li> <li>City of Fremont Decoto Road Complete Street project (Period 1, 2021-2035, \$20 million) – no project commitments needed</li> </ul>
Overarching issues for Local Rapid and Express Bus: Transit projects that primarily benefit commute trips receive an equity flag. Projects were originally submitted with visionary costs and need to be revised to prioritize higher performing routes.					
AC Transit	AC Transit Local Rapid Network: Capital Improvements + Service Increase		x		Staff have worked with AC Transit to scale the project scope and costs down to the highest performing routes. No additional commitments or changes needed. AC Transit is confirming this approach with its Board in July. Recommending for inclusion in Period 1, 2021-2035.
AC Transit	AC Transit Transbay Network: Capital		x	x	Staff have worked with AC Transit to scale the project scope and costs down to the highest performing routes. AC Transit

Project Sponsor	Major Project	Performance Flag:			Proposed Path Forward
		GP	BC	Equity	
	Improvements + Service Increase				staff is also recommending to its Board commitments to explore additional routes serving East Oakland and West Contra Costa County to address equity concerns raised by MTC. AC Transit is confirming this approach with its Board in July. Recommending for inclusion of Phase 1 of improvements in Period 1, 2021-2035 and Phase 2 of improvements in 2035-2050.
Overarching issues for Regional and Interregional Rail: Staff have communicated to MTC the limitations of evaluating rail network projects in isolation, and the limitations of the tool to estimate benefits of interregional projects. Transit projects that primarily benefit commute trips receive an equity flag.					
ACE/ SJRRA	ACE Rail Service Increase (10 Daily Roundtrips – original project submitted by ACE)			x	<p>Staff worked with ACE to reduce the scope and cost of the project. In addition, ACE committed to a number of equity concerns raised by MTC, including:</p> <ul style="list-style-type: none"> <li>• Means-based fares</li> <li>• Fare integration (i.e. transfer discounts and integrated intercity passenger rail payment program)</li> <li>• Transit-orient development and affordable housing focus at stations</li> <li>• Marketing and outreach to disadvantaged communities</li> </ul> <p>Recommend including service increases to 6 daily roundtrip trains in the 2035-2050 timeframe due to lack of regional discretionary funding. Recommend including requests for regional discretionary funding to increase to 8 daily roundtrips in the 2035-2050 timeframe.</p>
ACE/ SJRRA and TVSJVRRRA	Altamont Corridor Vision Phase 1 (to San Joaquin Valley)		x	x	ACE and the TVSJVRRRA have continued to express interest in pursuing the project but given the concerns MTC has raised,

Project Sponsor	Major Project	Performance Flag:			Proposed Path Forward
		GP	BC	Equity	
					are focusing on Valley Link and the ACE Rail Service Increase project for PBA 2050.
SamTrans	Dumbarton Rail (Redwood City to Union City)		x	x	SamTrans is working directly with MTC on revisions to the project scope and any project commitments. The project scope will be reduced to the light rail alternative that the project sponsor has been developing. Additional project commitments are not known at this time.

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August 1, 2020

Therese W. McMillan  
 Executive Director  
 Metropolitan Transportation Commission  
 375 Beale Street Suite 700  
 San Francisco, CA 94105

RE: Bay Area Express Lanes Project Performance in Plan Bay Area 2050

Dear Ms. McMillan:

This letter is in response to the Plan Bay Area 2050 Project Performance Assessment (PPA) findings for the Regional Express Lanes Network. The PPA indicated a few performance shortcomings for the Regional Express Lanes Network, including underperforming benefit-cost ratios, equity and GHG scores. We are writing to convey the regional plan to address these underperformance issues.

For the last year, a working group consisting of Bay Area Express Lanes partners has met to develop an Express Lanes Strategic Plan. This group is collaborating to shape the future of the Express Lanes Network, consistent with the vision and goals of Plan Bay Area 2050. We believe it shows promising benefits if integrated cost-effectively with transit, affordability, and other Plan Bay Area programs. The working group recently developed network scenarios that integrate Plan Bay Area goals and presented them to the MTC Operations Committee in May for Commissioner feedback. Having implemented the recommended changes and presented to the MTC Operations Committee in June, the working group will soon submit a revised Regional Express Lane Network for inclusion into Plan Bay Area 2050.

This letter demonstrates the working group's commitment to improving the network's cost effectiveness, equity and GHG reduction performance while meeting Federal and State operational requirements by: prioritizing segments that support transit/carpooling and provide seamless travel, incorporating projects that utilize conversion of existing right of way over expansion where possible, committing to a means-based toll discount pilot, and implementing public engagement best practices. In addition to revising the Network for Plan Bay Area 2050, the group plans to develop a series of white papers over the summer of 2020 to inform policies and future project development. The outcomes of these white papers along with the revised Regional Express Lanes Network will be documented in a final Regional Express Lanes Strategic Plan at the end of 2020. Some highlights of work to date and upcoming work include:

**Increasing Benefits; Decreasing Costs**

The working group is revising the Regional Express Lanes Network to reflect:

- Segments that can more realistically be built in the next 15 years as well as the next 30 years based on available funds, including local funding commitments to project development and construction, and financing. For example, the costly 580/680 and 680/80 direct connectors most likely will not fit within the funding envelope for this period.
- Segments that support existing and potential future public transit services that advance the equity and GHG goals outlined in the Strategic Plan.

- Prioritization of HOV lane and general-purpose lane conversions (pending changes in legislation and traffic impact analysis) over construction of new lanes to reduce per-mile capital cost and the risk of induced demand/GHG. For example, Ala-580, SF-101/280, SCL 680/280 and SM-101 will evaluate take-a-lane and/or shoulder lane strategies as potential alternatives during the environmental process to evaluate impacts on GHG emissions and operations. Where new lanes are added, it may be possible to use paved right of way to reduce costs.

#### **Local Funding**

Express lanes bring considerable resources to the table to fund their construction, operations and maintenance. This sets them apart from other transportation management strategies.

- The express lanes operating and maintenance costs are covered by express lanes toll revenue and require no regional funds to keep the express lanes in a state of good repair.
- There is \$300 million in capital funding set aside for the express lanes network in Regional Measure 3. MTC is proposing a framework for local RM3 express lane funding to leverage state and federal funding to the greatest extent possible.
- The county transportation agencies plan to leverage over \$80 million in local funds to build the Regional Express Lanes Network.
- Express lane toll revenue can be used to finance the buildout of the network. The financial analysis used in Plan Bay Area 2040 demonstrated the ability to finance up to 60% of the total capital cost. In addition, several projects already in operation and under construction have financed a share of their capital costs with future toll revenue.

#### **Green House Gas**

To decrease GHG emissions, the working group is focusing on projects and programs that increase mode shift and average vehicle occupancy, including:

- Focusing on early delivery of projects with a high potential for express bus ridership and identifying policies that support future express bus service.
- Exploring the use of express lane revenues to support investments in express buses, mobility hubs and other investments to increase bus ridership and carpooling.
- Prioritizing projects that convert existing travel lanes (general-purpose and HOV lanes) to mitigate induced vehicles miles traveled and achieve GHG reduction goals. A white paper will be developed that looks in more detail on the impacts of interregional express lanes segments and dual express lane segments on VMT/GHG.

#### **Equity**

The working group recognizes that equity is a key objective for the Express Lanes Network and is supportive of means-based tolling as one of various strategies in Plan Bay Area 2050 that could address equity. In the near-term, the working group supports a BAIFA-led pilot of means-based tolling on BAIFA's express lanes. At the same time, San Mateo and SFCTA are undertaking studies to better understand and advance equity. These studies may result in additional pilots that complement BAIFA's pilot.

**Plan Bay Area Concepts**

In addition, the express lane partner agencies support high-performing policies and projects in the Plan Bay Area 2050 Draft Blueprint:

- Eventual transition to congestion pricing on all freeway lanes in corridors with robust transit options. Express lanes can be a stepping stone to more extensive congestion pricing strategies. Prior to such implementation, further investigation is needed to better understand how congestion pricing on freeways may be implemented and the potential impacts on express lane operations as well as local roadways and transit.
- Lowering the speed limit to 55 miles per hour on freeways to improve safety. During congested periods the general-purpose lanes typically flow well below that speed, and so the express lanes could still offer a travel time and reliability advantage.
- Expansion of local bus services and non-motorized modes that serve shorter trips of all types and thus complement express lanes and express bus service, which tend to serve longer, largely commute trips.
- Integrated transit fares and payment platforms, which can help implement affordability policies and provide incentives for using transit, ridesharing and first and last mile services.

As a region, we are committed to implementing an Express Lane Network that serves the community and the surrounding environment equitably, cost-effectively and sustainably in order to advance the goals of Plan Bay Area 2050. We look forward to hearing your thoughts and discussing this further. If you have any questions about this format, please contact Jim Macrae at [jmacrae@bayareametro.gov](mailto:jmacrae@bayareametro.gov).

Sincerely,

ALAMEDA COUNTY TRANSPORTATION  
COMMISSION

BAY AREA INFRASTRUCTURE FINANCE AUTHORITY

---

Tess Lengyel, Executive Director

---

Andrew B. Fremier, Deputy Executive Director,  
Operations

Date: \_\_\_\_\_

Date: \_\_\_\_\_

SAN FRANCISCO COUNTY TRANSPORTATION  
AUTHORITY

SAN MATEO CITY/COUNTY ASSOCIATION OF  
GOVERNMENTS (C/CAG)

---

Tilly Chang, Executive Director

---

Sandy Wong, Executive Director

Date:

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Date:

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SAN MATEO COUNTY TRANSPORTATION  
AUTHORITY

SAN MATEO COUNTY EXPRESS LANES JOINT  
POWERS AUTHORITY (SMCEL-JPA)

---

Jim Hartnett, Executive Director

---

Jim Hartnett, Executive Council

Date:

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Date:

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SAN MATEO COUNTY EXPRESS LANES JOINT  
POWERS AUTHORITY (SMCEL-JPA)

SANTA CLARA VALLEY TRANSPORTATION  
AUTHORITY (VTA)

---

Sandy Wong, Executive Council

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Deborah Dagang, Director of Planning and  
Programming

Date:

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Date:

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August 24, 2020

Therese W. McMillan  
Executive Director  
Metropolitan Transportation Commission  
375 Beale Street Suite 700  
San Francisco, CA 94105

RE: Bay Area Express Lanes Project Performance in Plan Bay Area 2050

Dear Ms. McMillan:

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For the last year, a working group consisting of Bay Area Express Lanes partners has met to develop an Express Lanes Strategic Plan. This group is collaborating to shape the future of the Express Lanes Network, consistent with the vision and goals of Plan Bay Area 2050. We believe it shows promising benefits if integrated cost-effectively with transit, affordability, and other Plan Bay Area programs. The working group recently developed network scenarios that integrate Plan Bay Area goals and presented them to the MTC Operations Committee in May for Commissioner feedback. Having implemented the recommended changes and presented to the MTC Operations Committee in June, the working group will soon submit a revised Regional Express Lane Network for inclusion into Plan Bay Area 2050.

This letter demonstrates the working group's commitment to improving the network's cost effectiveness, equity and GHG reduction performance while meeting Federal and State operational requirements by: prioritizing segments that support transit/carpooling and provide seamless travel, incorporating projects that utilize conversion of existing right of way over expansion where possible, committing to a means-based toll discount pilot, and implementing public engagement best practices. In addition to revising the Network for Plan Bay Area 2050, the group plans to develop a series of white papers over the summer of 2020 to inform policies and future project development. The outcomes of these white papers along with the revised Regional Express Lanes Network will be documented in a final Regional Express Lanes Strategic Plan at the end of 2020. Some highlights of work to date and upcoming work include:

**Increasing Benefits; Decreasing Costs**

The working group is revising the Regional Express Lanes Network to reflect:

- Segments that can more realistically be built in the next 15 years as well as the next 30 years based on available funds, including local funding commitments to project development and construction, and financing. For example, the costly 580/680 and 680/80 direct connectors most likely will not fit within the funding envelope for this period.
- Segments that support existing and potential future public transit services that advance the equity and GHG goals outlined in the Strategic Plan.

- Prioritization of HOV lane and general-purpose lane conversions (pending changes in legislation and traffic impact analysis) over construction of new lanes to reduce per-mile capital cost and the risk of induced demand/GHG. For example, Ala-580, SF-101/280, SCL 680/280 and SM-101 will evaluate take-a-lane and/or shoulder lane strategies as potential alternatives during the environmental process to evaluate impacts on GHG emissions and operations. Where new lanes are added, it may be possible to use paved right of way to reduce costs.

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- The express lanes operating and maintenance costs are covered by express lanes toll revenue and require no regional funds to keep the express lanes in a state of good repair.
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#### **Green House Gas**

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- Exploring the use of express lane revenues to support investments in express buses, mobility hubs and other investments to increase bus ridership and carpooling.
- Prioritizing projects that convert existing travel lanes (general-purpose and HOV lanes) to mitigate induced vehicles miles traveled and achieve GHG reduction goals. A white paper will be developed that looks in more detail on the impacts of interregional express lanes segments and dual express lane segments on VMT/GHG.

#### **Equity**

The working group recognizes that equity is a key objective for the Express Lanes Network and is supportive of means-based tolling as one of various strategies in Plan Bay Area 2050 that could address equity. In the near-term, the working group supports a BAIFA-led pilot of means-based tolling on BAIFA's express lanes. At the same time, San Mateo and SFCTA are undertaking studies to better understand and advance equity. These studies may result in additional pilots that complement BAIFA's pilot.

**Plan Bay Area Concepts**

In addition, the express lane partner agencies support high-performing policies and projects in the Plan Bay Area 2050 Draft Blueprint:

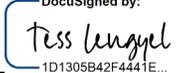
- Eventual transition to congestion pricing on all freeway lanes in corridors with robust transit options. Express lanes can be a stepping stone to more extensive congestion pricing strategies. Prior to such implementation, further investigation is needed to better understand how congestion pricing on freeways may be implemented and the potential impacts on express lane operations as well as local roadways and transit.
- Lowering the speed limit to 55 miles per hour on freeways to improve safety. During congested periods the general-purpose lanes typically flow well below that speed, and so the express lanes could still offer a travel time and reliability advantage.
- Expansion of local bus services and non-motorized modes that serve shorter trips of all types and thus complement express lanes and express bus service, which tend to serve longer, largely commute trips.
- Integrated transit fares and payment platforms, which can help implement affordability policies and provide incentives for using transit, ridesharing and first and last mile services.

As a region, we are committed to implementing an Express Lane Network that serves the community and the surrounding environment equitably, cost-effectively and sustainably in order to advance the goals of Plan Bay Area 2050. We look forward to hearing your thoughts and discussing this further. If you have any questions about this format, please contact Jim Macrae at [jmacrae@bayareametro.gov](mailto:jmacrae@bayareametro.gov).

Sincerely,

ALAMEDA COUNTY TRANSPORTATION  
COMMISSION

BAY AREA INFRASTRUCTURE FINANCE AUTHORITY

DocuSigned by:  
  
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Tess Lengyel, Executive Director

DocuSigned by:  
  
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Andrew B. Fremier, Deputy Executive Director,  
Operations

Date: 8/27/2020

Date: 8/25/2020

SAN FRANCISCO COUNTY TRANSPORTATION  
AUTHORITY

DocuSigned by:  
*Tilly Chang*  
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Tilly Chang, Executive Director

Date: 9/1/2020

SANTA CLARA VALLEY TRANSPORTATION  
AUTHORITY (VTA)

DocuSigned by:  
*Deborah Dagang*  
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Deborah Dagang, Director of Planning and  
Programming

Date: 8/27/2020

## San Mateo County Express Lanes Joint Powers Authority (JPA)

City/County Association of Governments of San Mateo County ❖ San Mateo County Transportation Authority

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August 25, 2020

Therese W. McMillan  
Executive Director  
Metropolitan Transportation Commission  
375 Beale Street Suite 700  
San Francisco, CA 94105

RE: Bay Area Express Lanes Project Performance in Plan Bay Area 2050

Dear Ms. McMillan:

This letter is in response to the Plan Bay Area 2050 Project Performance Assessment (PPA) findings for the Regional Express Lanes Network. The PPA indicated a few performance shortcomings for the Regional Express Lanes Network, including underperforming benefit-cost ratios, equity and GHG scores. We are writing to convey the regional plan to address these underperformance issues.

For the last year, a working group consisting of Bay Area Express Lanes partners has met to develop an Express Lanes Strategic Plan. This group is collaborating to shape the future of the Express Lanes Network, consistent with the vision and goals of Plan Bay Area 2050. We believe it shows promising benefits if integrated cost-effectively with transit, affordability, and other Plan Bay Area programs. The working group recently developed network scenarios that integrate Plan Bay Area goals and presented them to the MTC Operations Committee in May for Commissioner feedback. Having implemented the recommended changes and presented to the MTC Operations Committee in June, the working group will soon submit a revised Regional Express Lane Network for inclusion into Plan Bay Area 2050.

This letter demonstrates the working group's commitment to improving the network's cost effectiveness, equity and GHG reduction performance while meeting Federal and State operational requirements by: prioritizing segments that support transit/carpooling and provide seamless travel, incorporating projects that utilize conversion of existing right of way over expansion where possible, committing to a means-based toll discount pilot, and implementing public engagement best practices. In addition to revising the Network for Plan Bay Area 2050, the group plans to develop a series of white papers over the summer of 2020 to inform policies and future project development. The outcomes of these white papers along with the revised Regional Express Lanes Network will be documented in a final

Regional Express Lanes Strategic Plan at the end of 2020. Some highlights of work to date and upcoming work include:

**Increasing Benefits; Decreasing Costs**

The working group is revising the Regional Express Lanes Network to reflect:

- Segments that can more realistically be built in the next 15 years as well as the next 30 years based on available funds, including local funding commitments to project development and construction, and financing. For example, the costly 580/680 and 680/80 direct connectors most likely will not fit within the funding envelope for this period.
- Segments that support existing and potential future public transit services that advance the equity and GHG goals outlined in the Strategic Plan.
- Prioritization of HOV lane and general-purpose lane conversions (pending changes in legislation and traffic impact analysis) over construction of new lanes to reduce per-mile capital cost and the risk of induced demand/GHG. For example, Ala-580, SF-101/280, SCL 680/280 and SM-101 will evaluate take-a-lane and/or shoulder lane strategies as potential alternatives during the environmental process to evaluate impacts on GHG emissions and operations. Where new lanes are added, it may be possible to use paved right of way to reduce costs.

**Local Funding**

Express lanes bring considerable resources to the table to fund their construction, operations and maintenance. This sets them apart from other transportation management strategies.

- The express lanes operating and maintenance costs are covered by express lanes toll revenue and require no regional funds to keep the express lanes in a state of good repair.
- There is \$300 million in capital funding set aside for the express lanes network in Regional Measure 3. MTC is proposing a framework for local RM3 express lane funding to leverage state and federal funding to the greatest extent possible.
- The county transportation agencies plan to leverage over \$80 million in local funds to build the Regional Express Lanes Network.
- Express lane toll revenue can be used to finance the buildout of the network. The financial analysis used in Plan Bay Area 2040 demonstrated the ability to finance up to 60% of the total capital cost. In addition, several projects already in operation and under construction have financed a share of their capital costs with future toll revenue.

**Green House Gas**

To decrease GHG emissions, the working group is focusing on projects and programs that increase mode shift and average vehicle occupancy, including:

- Focusing on early delivery of projects with a high potential for express bus ridership and identifying policies that support future express bus service.
- Exploring the use of express lane revenues to support investments in express buses, mobility hubs and other investments to increase bus ridership and carpooling.

- Prioritizing projects that convert existing travel lanes (general-purpose and HOV lanes) to mitigate induced vehicles miles traveled and achieve GHG reduction goals. A white paper will be developed that looks in more detail on the impacts of interregional express lanes segments and dual express lane segments on VMT/GHG.

#### **Equity**

The working group recognizes that equity is a key objective for the Express Lanes Network and is supportive of means-based tolling as one of various strategies in Plan Bay Area 2050 that could address equity. In the near-term, the working group supports a BAIFA-led pilot of means-based tolling on BAIFA's express lanes. At the same time, San Mateo and SFCTA are undertaking studies to better understand and advance equity. These studies may result in additional pilots that complement BAIFA's pilot.

#### **Plan Bay Area Concepts**

San Mateo County understands a number of high-performing policies and projects are proposed in the Plan Bay Area 2050 Draft Blueprint, including some of the concepts outlined below. While San Mateo County supports the study of these concepts by the region, our support for exploring these concepts does not in any way commit San Mateo County to implementing them. Several of our leaders have expressed concerns about and objections to congestion pricing on all county freeway lanes. However, we are willing to support studying these concepts to lead to a better understanding of their benefits, challenges and suitability for implementation:

- Eventual transition to congestion pricing on all freeway lanes in corridors with robust transit options. Express lanes can be a stepping stone to more extensive congestion pricing strategies. Prior to such implementation, further investigation is needed to better understand how congestion pricing on freeways may be implemented and the potential impacts on express lane operations as well as local roadways and transit.
- Lowering the speed limit to 55 miles per hour on freeways to improve safety. During congested periods the general-purpose lanes typically flow well below that speed, and so the express lanes could still offer a travel time and reliability advantage.
- Expansion of local bus services and non-motorized modes that serve shorter trips of all types and thus complement express lanes and express bus service, which tend to serve longer, largely commute trips.
- Integrated transit fares and payment platforms, which can help implement affordability policies and provide incentives for using transit, ridesharing and first and last mile services.

We are submitting this letter to support the region in implementing an Express Lane Network that serves the community and the surrounding environment equitably, cost-effectively and sustainably in order to advance the goals of Plan Bay Area 2050. We look forward to hearing your thoughts and discussing this further.

Sincerely,

SAN MATEO COUNTY EXPRESS LANES JOINT  
POWERS AUTHORITY (SMCEL-JPA)



\_\_\_\_\_  
Jim Hartnett, Executive Council

SAN MATEO COUNTY EXPRESS LANES JOINT  
POWERS AUTHORITY (SMCEL-JPA)



\_\_\_\_\_  
Sandy Wong, Executive Council

Date: August 26, 2020

Date: 8/25/20



Bay Area Toll Authority  
**BAY AREA TOLL AUTHORITY**  
BAY AREA METRO CENTER  
375 BEALE STREET  
SAN FRANCISCO, CA 94105

TEL 415.778.6700  
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*U.S. Department of Transportation*

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*Cities of Contra Costa County*

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*Executive Director*

**ALIX BOCKELMAN**  
*Deputy Executive Director, Policy*

**ANDREW B. FREMIER**  
*Deputy Executive Director, Operations*

**BRAD PAUL**  
*Deputy Executive Director Local Government Services*

April 10, 2020

Therese W. McMillan, Executive Director  
Metropolitan Transportation Commission  
375 Beale Street Suite 700  
San Francisco, CA 94105

RE: Bay Skyway Performance in Plan Bay Area 2050

Dear Ms. McMillan:

This letter is in response to the Plan Bay Area 2050 Project Performance Assessment (PPA) findings for the Bay Bridge West Span Bike Path. The PPA indicated underperforming equity scores and benefit-cost ratios for this project. We are writing to convey the regional plan to address these performance issues.

Since this project was originally scored, it has been renamed "Bay Skyway," in recognition of its potential role beyond a traditional bike path and its expected reach beyond just the Bay Bridge West Span, both in terms of geography (particularly with the rapid growth of electric-assist bicycles) and "8-to-80" design, which is entirely ADA-compliant Class I multi-use paths, completely separate from traffic.

This commitment letter covers these changes, as well as supportive policies, and is organized into the following three sections:

1. **Introduction:** Explains how the Bay Skyway helps the region achieve five of the nine Blueprint strategies.
2. **Equity:** Demonstrates how the project will directly increase mobility, access to high-paying jobs and exposure to San Francisco's unique cultural and recreational opportunities in some of the region's highest concentration Communities of Concern.
3. **Benefits/Costs:** Discusses ways the project will address the benefit and cost deficiencies identified in the Plan Bay Area analysis.

**1. Introduction:** The Bay Skyway directly supports five of the nine Blueprint strategies, thereby providing multiple valuable benefits to the region:

- 1) **Maintain Existing Infrastructure:** Caltrans maintenance will be able to use the path, thus avoiding current daily lane closures, reducing maintenance costs and traffic disruption, and improving traffic safety.
- 2) **Create Healthy and Safe Streets:** The entire 5.5-mile length of the Bay Skyway (including the existing 2-mile-long East Span path) will be Class I pathway separate from traffic, providing a continuously protected bike facility connecting West Oakland and Treasure Island to downtown San Francisco. This route avoids myriad potential conflicts with trucks, rail and autos around the Port of Oakland, and eliminates the need to bike, scoot or walk on narrow, busy Yerba Buena Island roads.
- 3) **Enhance Regional and Local Transit:** MTC's 2017 [Core Capacity Transit Study](#) showed that demand in the pre-virus Transbay Corridor was 5% over capacity, with that shortfall expected to climb to 150% by 2040 assuming all planned investments (i.e., more BART cars, AC Transit buses, and ferries, and a new BART controller). The Bay Skyway is expected to attract 1,700

commuters per peak-hour/direction<sup>1</sup> (not including recreational trips), the equivalent of half a lane of Bay Bridge commute traffic, 8.5 BART cars or 24 buses, which will help fill the projected gap between peak hour/direction Transbay commute capacity and demand (see Figure 1). To the extent that the path will attract current transit passengers, it will have a double impact by moving passengers – and their bikes – out of trains and buses. As explained in a recent TRB paper<sup>2</sup>, this analysis used an accessibility model because traditional travel demand models often do not take factors into consideration such as the time advantage of e-bikes over traditional bicycles (comparable to transit for some trips when wait and transfer times are included), bike/e-bike mode share increases as trip distances shrink, additional attractiveness of a single door-to-door mode, and the effect of safe bike infrastructure on mode share, based on empirical studies.

- 6) **Improve Economic Mobility:** The Bay Skyway provides a free commute option for residents of lower cost East Bay housing to reach high wage jobs.
- 9) **Reduce Environmental Impacts:** The Bay Skyway provides a zero GGH emission commute for a half-lane worth of auto traffic. These air quality impacts will be most concentrated in the Communities of Concern surrounding the Bay Bridge approaches.

Furthermore, the Bay Skyway will help achieve two Project Performance Assessment goals, to identify projects that help the Bay Area become resilient to future uncertainty (e.g., gas shortages, transit strikes or breakdowns, need for social distancing) and support equitable outcomes (see Equity discussion below).

**2. Equity:** The Bay Skyway will provide a free Transbay commute option to higher wage San Francisco jobs for people who travel by bike or e-bike. Besides Treasure Island, this experience will be shortest and most convenient to those living near the project's Oakland touchdown, at Mandela Parkway and West Grand Avenue, on the border between two West Oakland [Communities of Concern](#), both in MTC's highest poverty category. In addition to a sub-one-hour commute (sub-45 minutes by e-bike), this facility will open San Francisco's cultural and recreational opportunities to residents of West Oakland and dozens of other East Bay Communities of Concern, from Richmond to San Leandro, via the Bay Trail and local networks (see Figure 2).

**3. Benefits/Costs:** The Bay Skyway will modify the Bay Bridge West Span Pathway to address the shortcomings revealed in the Project Performance Evaluation in the following areas:

#### Increase Benefits

##### a) Expand universe of users

- **By age & ability:** Design the entire alignment (including the existing East Span path) as a Class I multi-use "8-to-80" facility, to be appealing to commuters and others of all ages, experience and means, including many who don't commute by bike today.
- **By vehicle type:** Widen beyond width of East Span pathway to accommodate traditional bikes, as well as electric-assist bicycles, where highest volumes are expected (i.e., between Treasure Island and downtown San Francisco).
- **By e-bike ownership:** Replicate the Richmond-San Rafael E-Bike Commute Program, which is exploring strategies to loan, lease and gift e-bikes to weekday Transbay commuters.
- **With subsidies:** Maximize e-bike use via regional subsidies.

<sup>1</sup>According to FHWA, a 1-way, 1-lane bike path has a capacity of 1,700-2,350 bikes/hour (see [www.fhwa.dot.gov/publications/research/safety/pedbike/05137/05137.pdf](http://www.fhwa.dot.gov/publications/research/safety/pedbike/05137/05137.pdf), p.23). Although these volumes exceed those currently seen on comparable facilities, such as the Golden Gate Bridge, they are reasonable given the dense housing and jobs at the Bay Skyway termini.

<sup>2</sup> Kaylor J, Coffin R, Fremier A; Alternate Bicycle Forecasting Methodology for the San Francisco-Oakland Bay Bridge West Span Pathway Project with the Presence of Electric Assist Bikes; Transportation Research Record (2020).

- **With tighter environmental regulations:** Support policies to combat climate change consistent with the Clean & Green future (e.g., an ambitious, nationwide carbon tax).
- b) Optimize access from Communities of Concern**
  - Expand current BAAQMD low-income electric vehicle subsidies to e-bikes and e-scooters.
  - Support expanded, subsidized means-based e-bike share program (Bike Share for All).
  - Support community bike shop programs located in low-income and disadvantaged communities in the Bay Skyway commute-shed (e.g., Bikes 4 Life, Scraper Bikes, Rich City Bikes)
  - Integrate path into the West Oakland community with excellent wayfinding, starting from the East Bay touchdown at West Grand and Mandela Parkway.
- c) Reduce Bay Bridge congestion**
  - Beyond increasing Bridge capacity, design path to allow Caltrans maintenance vehicle use, thus avoiding current daily lane closures and reducing early morning congestion from the Peninsula.

#### **Reduce Costs & Attract Local and Private Funding**

- d) Reduce costs**
  - Delete connection to Treasure Island ferry (\$36 million, which reduces cost to \$404 million).
  - Ask Caltrans to provide their resources in direct project delivery efforts, as opposed to in an oversight capacity.
- e) Attract local, private and stimulus funding**
  - Alameda CTC is scheduled to approve design funds in May 2020.
  - BATA is in discussions with SFCTA regarding funding for the YBI bridge connector path.
  - Demonstrate innovative and efficient approach to approval and construction in order to attract private philanthropic support. (Interest in the tens of millions of dollars and corporate interest has already been expressed.)
  - Use Bay Skyway as statewide model of innovative and efficient infrastructure delivery.
  - Position Bay Skyway as a regional resiliency project for future stimulus funds.

It is difficult to imagine another project with the ability to add more than the equivalent of a half-lane of westbound AM peak hour Transbay capacity to the ultra-congested Transbay corridor that does not add one car to the bridge or increase VMT or greenhouse gas emissions. In recognition of this opportunity, on March 11, 2020, the BATA Oversight Committee directed staff to create a multi-year work plan for the project to allow them to consider the impact of the work needed to move it forward on the agency's overall work plan in the context of upcoming budget discussions. While my staff is developing a phased project timeline and funding plan, per this direction, we look forward to working collaboratively with you to refine the project and develop strategies to increase its ability to achieve the Blueprint's strategies.

Sincerely,

DocuSigned by:  
  
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Andrew B. Premier  
 Deputy Executive Director

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<https://mtcdrive.app.box.com/folder/110080468650>  
 Attachment

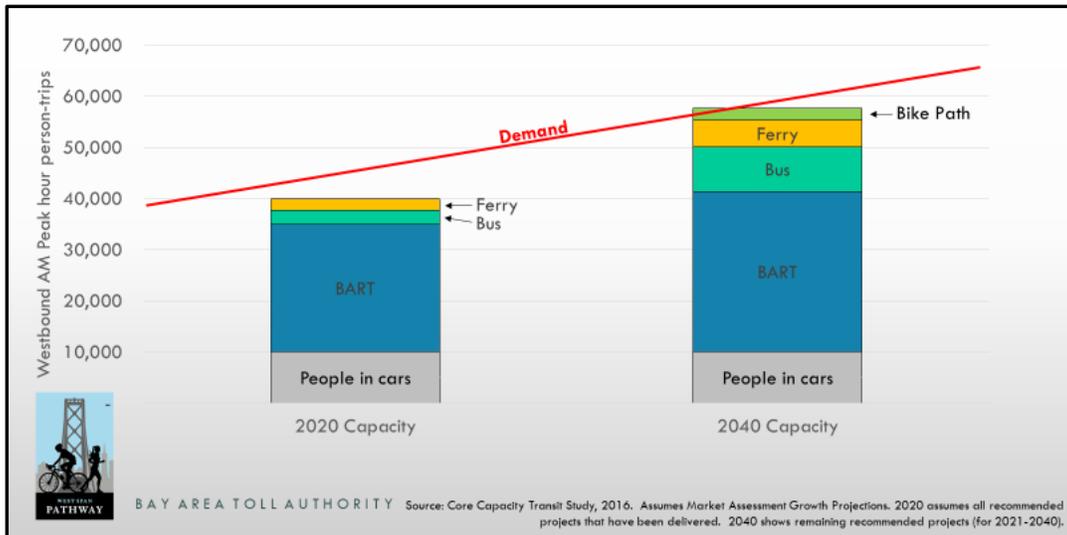


Figure 1: Transbay Capacity vs Demand (2020 and 2040)

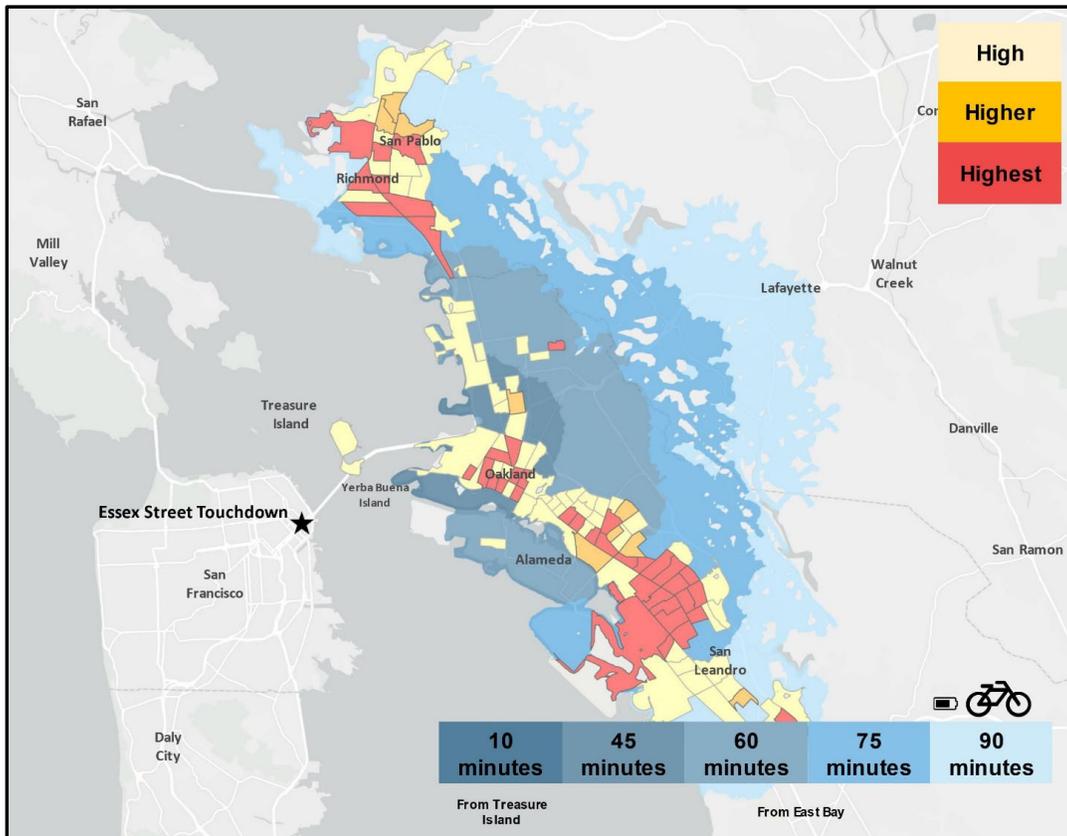


Figure 2: Communities of Concern overlaid on e-bike isochrones (bike commute-shed from downtown SF)



April 6, 2020

Ms. Alix Bockelman  
Deputy Executive Director  
Metropolitan Transportation Commission  
Association of Bay Area Governments

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JIM HARTNETT  
EXECUTIVE DIRECTOR

Subject: Plan Bay Area 2050: Draft Blueprint Framework – Comments on Caltrain-related Projects

Dear Ms. Bockelman:

Caltrain staff would like to thank MTC for sharing the final project performance assessment results and the Draft Blueprint for Plan Bay Area 2050. We recognize that this has taken great time and effort from your staff, and we would like to take this opportunity to provide a revised project submission for Caltrain for inclusion in the Final Blueprint for Plan Bay Area 2050. We believe this submittal, the "Caltrain Enhanced Growth" scenario, addresses all concerns raised by MTC during the performance assessment and provides for an incremental advancement of Caltrain's overall Service Vision that can more readily be accommodated within a fiscally constrained Regional Transportation Plan.

As MTC staff is aware, Caltrain previously submitted three long-term projects to be evaluated through the Horizons/Plan Bay Area 2050 process: the 2040 Caltrain Base Growth Scenario, the 2040 Caltrain Moderate Growth Scenario, and the 2040 Caltrain High Growth Scenario. These three long-term service scenarios were developed through the collaborative, extensive planning process for the Caltrain Business Plan. On October 3, 2019, the Caltrain Board of Directors unanimously adopted the railroad's Long-Range Service Vision, which directs staff to plan for a level of service commensurate with the 2040 Moderate Growth Scenario while simultaneously working with the region and State towards achieving the levels of service envisioned in the 2040 High Growth Scenario.

Our revised project for Plan Bay Area 2050 is an incremental advancement of Caltrain's Long-Range Service Vision. The Caltrain Enhanced Growth Scenario includes enhanced service levels that will maximize the use of available infrastructure and more fully serve expected market demand on the Caltrain corridor over the next decade and beyond. It will deliver many benefits to the region, including increased capacity to support ridership growth, longer time periods for peak service, and additional service in the off-peak periods, at significantly lower costs than the three previously submitted projects (while still remaining entirely consistent with the system's ultimate Long-Range Vision).

As MTC continues to plan for the future of the Bay Area's rail and transit network with Plan Bay Area 2050, we would request that MTC include the Caltrain Enhanced Growth Scenario in its Final Blueprint, along with Caltrain's already-committed projects, including the Peninsula Corridor Electrification Project. In the attached memo, we have provided additional information

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San Carlos, CA 94070-1306 650.508.6269

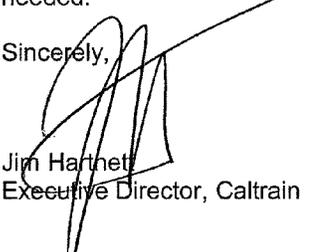
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about the Caltrain Enhanced Growth Scenario project, as well as our comments and strategies regarding performance issues that were flagged during MTC's Horizons/Plan Bay Area project performance evaluation process. We have also provided illustrative service schedules for the Enhanced Growth Scenario in a second attachment to this letter. The Enhanced Growth Scenario was presented to the Peninsula Corridor Joint Powers Board at their March 2020 meeting and staff described our intent to submit this revised project to MTC as part of the Plan Bay Area process.

Additionally, we would strongly urge that rather than use a project-based approach, MTC employ a regional network approach when selecting projects to include in the Final Blueprint and the fiscally constrained Regional Transportation Plan. The Caltrain Enhanced Growth Scenario is a critical foundation to developing the region's integrated rail network, including the Caltrain Downtown Extension and the San Francisco-Oakland Transbay Rail Crossing. While there are a number of regional and statewide rail planning efforts underway, we believe that the Bay Area's Regional Transportation Plan should support an integrated approach to phasing and developing the region's rail network through its project selection process.

Lastly, we would like to again express our appreciation to MTC staff for their thoughtful and collaborative approach to the significant undertaking of Plan Bay Area 2050 – especially Dave Vautin, Adam Noelting, and Anup Tapase. We would also like to thank Melanie Choy for her ongoing participation in the Caltrain Business Plan process. Caltrain appreciates MTC's partnership, and we are happy to provide further information or discuss this project submittal as needed.

Sincerely,



Jim Harnett  
Executive Director, Caltrain

Attachments:

- Attachment A – Detailed Memo on Caltrain's Revised Project Submission to MTC
- Attachment B – Spring 2020 Update on Caltrain Business Plan (including information on Caltrain's "Enhanced Growth Scenario" as well as connectivity and equity assessment analysis)
- Attachment C – Caltrain Enhanced Growth Scenario: Illustrative Service Schedules for 2022 and 2027

## **Attachment A: Detailed Memo on Caltrain's Revised Project Submission to MTC**

### **Overview and Background**

As MTC staff is aware, Caltrain has been engaged in developing the Caltrain Business Plan over the last two years. This significant and collaborative planning process initially focused on the development of a long-range service vision for the railroad and a companion investment plan for both Caltrain rail service and the larger rail corridor, running from San Francisco through San Jose to Gilroy. On October 3, 2019, the Caltrain Board of Directors unanimously adopted a Long-Range Service Vision for the railroad, which provides high-level policy guidance to evolve the Caltrain corridor and service from a traditional commuter railroad to a regional rail system operating at transit-level frequencies throughout the day. The adopted Service Vision directs staff to plan for a level of service commensurate with the 2040 Moderate Growth Scenario while simultaneously working with the region and State towards development of a larger regional rail system that could include level of train service specified in the 2040 High Growth Scenario.

Since the Long-Range Service Vision was adopted, Caltrain staff has continued to work on the Business Plan to finish rounding out the Service Vision with additional analysis and stakeholder outreach. In particular, we have been focused on additional technical and policy analysis to identify on what incremental improvement Caltrain can achieve over the next decade and the key near-term steps and work that will be needed to make it happen. This has included developing nearer-term service concepts for Caltrain's initial electric service and options for additional, incremental growth and investment in Caltrain service through the 2020s, building towards the Long-Range Service Vision, as well as developing financial projections and funding plans to accompany the updated service concepts. We have also analyzed connections to other transit systems and station access options, and have completed an equity analysis that includes identification of opportunities to improve equitable access to Caltrain. Lastly, we have also been developing a longer-term funding strategy to achieve Caltrain's Long-Range Service Vision, which identifies about \$25 billion in investments along the corridor by Caltrain, cities, and partner agencies. All of these efforts will coalesce in the adoption of the Caltrain Business Plan by the Caltrain Board of Directors, anticipated in summer 2020.

This most recent work on the Caltrain Business Plan has culminated in the development of the "Caltrain Enhanced Growth Scenario," which we are submitting to MTC as a revised project for inclusion in the Final Blueprint of Plan Bay Area 2050 by way of this letter. The Enhanced Growth Scenario is a nearer-term, incremental project that moves the railroad toward achieving Caltrain's adopted Long-Range Service Vision. It includes the provision of enhanced service levels that will maximize the use of available infrastructure and more fully serve expected market demand on the corridor over the next decade and beyond.

We would like to note that because Caltrain is submitting this project for inclusion in the Final Blueprint for Plan Bay Area 2050, it should supersede the three previous Caltrain submissions for the Horizons/Plan Bay Area 2050 process in 2019. At that time, because the Business Plan was still in development and the Caltrain Board of Directors had not yet taken action to adopt a single Service Vision, we submitted the 2040 Baseline Growth Scenario, 2040 Moderate Growth Scenario, and 2040 High Growth Scenario to MTC in 2019 for inclusion in the Horizons/Plan Bay Area 2050 process. These three projects were evaluated as part of the Horizons/Plan Bay Area 2050 project performance assessment, along with two other Caltrain-related projects that

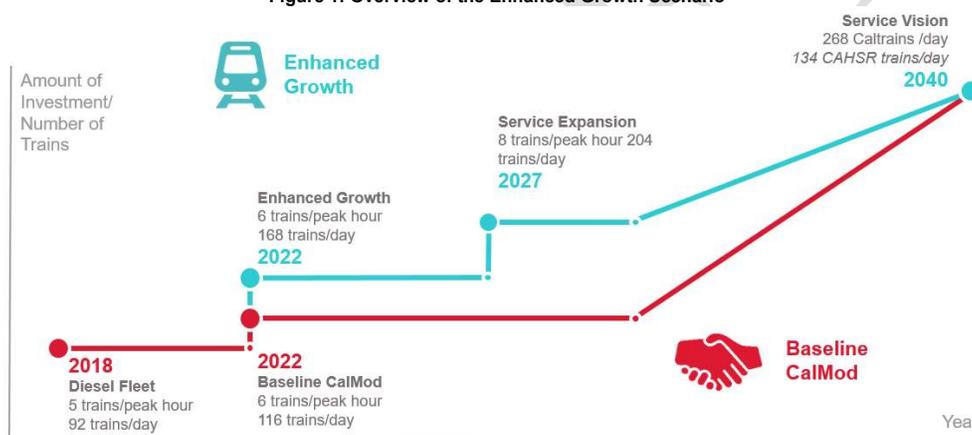
were submitted by partner agencies, the Downtown Extension project and San Francisco-Oakland Transbay Rail Crossing – Commuter Rail.

This memo includes more information about Caltrain’s revised project for Plan Bay Area 2050, the Caltrain Enhanced Growth Scenario, as well as our proposed strategies to address performance issues for Caltrain’s previous project submissions that were flagged by MTC in its initial project performance assessment through the Horizons/Plan Bay Area 2050 process in fall 2019.

### Caltrain Enhanced Growth Scenario

As noted above, the Caltrain Enhanced Growth Scenario is an incremental step towards achieving the railroad’s adopted Long-Range Service Vision. With increased service levels that maximize the use of available infrastructure, the Enhanced Growth Scenario will more fully serve the anticipated market demand on the corridor in the 2020s and beyond. Figure 1, below, shows how the Caltrain Enhanced Growth Scenario relates to Caltrain’s baseline commitment to electrification through the CalMod program in terms of both peak and overall weekday service levels.

Figure 1: Overview of the Enhanced Growth Scenario



Like the baseline CalMod project, the Caltrain Enhanced Growth Scenario includes commencing the start of electrified service in 2022 with 6 peak hour trains per hour per direction (7-car trains) in between San Francisco and San Jose, but it also expands peak periods and adds significantly greater levels of off-peak frequency to increase overall service to 168 trains per weekday. This enhanced service meets observed and projected market demand, allows for greater all-day connectivity to the larger regional transit network, and significantly advances equity on the Caltrain corridor by providing high quality off-peak service that meets the needs of customers who wish to use the system for reasons outside of traditional commuting.

The Enhanced Growth Scenario also includes a series of capital investments needed to grow Caltrain service to 8 peak hour trains per hour per direction (utilizing 7-car trains) by the end of the 2020s, increasing the daily service to a total of about 204 trains per day. Key required investments include:

- The full electrification and expansion of Caltrain’s mainline fleet

- The construction of additional train storage
- The improvement of platforms at Caltrain stations to achieve level boarding
- The reconfiguration or elimination of remaining holdout rule stations on the corridor

This service will lead to a massive increase in station stops along the Caltrain corridor, resulting in the significant majority of Caltrain stations receiving service levels of 4- or 8-trains per hour per direction (as compared to just a handful of stations that receive this level of service today). In addition to benefiting the Caltrain corridor communities, the Enhanced Growth Scenario will also benefit the wider Bay Area region. It will allow Caltrain to provide the service and capacity needed to make maximum use of the Downtown Extension once that project is open, and it will be foundational to the development of an integrated regional rail network, including potential future connections with the East Bay via the San Francisco-Oakland Transbay Rail Crossing.

As part of the Caltrain Business Plan, the ridership for the Enhanced Growth Scenario was modeled using the VTA/CCAG regional travel demand model. For the year 2030, two Enhanced Growth Scenarios were modeled – one with the Downtown Extension and one without the Downtown Extension – and the results showed substantial Caltrain ridership gains by directly connecting the railroad to the broader regional transit network via the Downtown Extension. Indeed, the 2030 Caltrain daily ridership was estimated to be around 113,000 riders without the Downtown Extension, while it was estimated to be nearly 143,000 riders with the Downtown Extension open (with 7-car trains constrained to capacity for peak hour/peak direction travel).

The table below summarizes additional details for this project. An illustrative service plan that corresponds to the Enhanced Growth Scenario is included as Attachment B to this memo. If MTC needs any additional information or has any questions regarding this revised project, we would be happy to provide assistance.

**Caltrain Enhanced Growth Scenario Details**

First Year of Operations	2022 (FY23) for 6, 7-car trains per peak hour per direction (tphpd) (~168 trains per day) 2027 (FY28) for 8, 7-car trains per peak hour per direction (~204 trains per day)
Annual O&M Costs in 2022 (corresponding to first year of electrified service with 6 tphpd)	\$245.43 million (\$YOE)
Annual O&M Costs in 2027 (corresponding to first year of 8 tphpd service)	\$329.53 million (\$YOE)
Capital Investment	No additional capital investment is needed for the 2022 service with 6 tphpd beyond committed/funded capital projects.  Additional capital investment is needed to commence 2027 service with 8 tphpd, including: additional EMU fleet; level boarding at station platforms; more train storage; minor track work; station improvements; and hold-out rule elimination at two stations.
Total Capital Investment Cost (excluding committed, funded projects) (\$2019)	\$1.211 billion for new enhancements to achieve 8 tphpd service by 2027

First Year of Construction (for additional capital investments)	2022 (FY23) (corresponding to improvements needed for 8 tphpd service)
Committed Funding (Capital)	\$564 million from Santa Clara, San Mateo Counties  (\$314 million from Measure B in Santa Clara County \$250 million from Measure A in San Mateo County and an amount to be determined from San Francisco)

### **Strategies to Address Performance Flags**

In the project performance assessment completed by MTC in 2019, Caltrain’s three submitted projects performed well in some regards, but also received flags for performance issues related to the Benefit-Cost Ratio Evaluation, Guiding Principles Evaluation, and Equity Evaluation. The sections below summarize our understanding of why these issues were flagged and includes our proposed strategies to address performance issues identified and to resolve any concerns about including this revised project in the Final Blueprint for Plan Bay Area 2050. If MTC staff would like additional information or has any questions, we would be happy to meet to discuss.

#### **Benefit-Cost Ratio Evaluation**

In the quantitative Benefit-Cost Ratio (BCR) Evaluation, all three of Caltrain’s projects scored between <0.5 and 1.0, with the best performances under the “Clean and Green” Future. Our submittals were flagged because their BCR scores did not exceed 1.0. Our understanding is that high capital costs for each of the previously submitted projects contributed to high lifecycle costs relative to MTC’s calculation of lifecycle benefits, thus resulting in lower BCR scores in MTC’s calculations.

The Caltrain Enhanced Growth Scenario addresses this performance issue by adjusting the variable that contributed to the lower BCR scores: the capital costs. Similar to the previous projects that the agency submitted in 2019, the Caltrain Enhanced Growth Scenario increases train service levels on the corridor, yet it has substantially lower capital costs compared to the three previously submitted projects. In fact, the Enhanced Growth Scenario capitalizes on infrastructure investments that are already committed and/or are being implemented on the Caltrain corridor, and its suite of additional capital investments include only those that are directly needed to support growth in train service to 8 peak hour trains per hour per direction. These investments are still fully consistent with the long-term build out envisioned in Caltrain’s Service Vision but represent a more modest incremental step. The Enhanced Growth Scenario’s capital investments total approximately \$1.2 billion – a fraction of the capital costs associated with Caltrain’s previous project submissions (previously, the lowest capital costs were approximately \$22 billion, associated with the 2040 Baseline Growth Scenario).

Of the previously submitted projects, we would estimate that the revised Enhanced Growth Scenario is most closely compared to the 2040 Baseline Growth Scenario, and by MTC’s calculations, it had lifecycle benefits in the range of \$3-5 billion (variable by Future). Even though the lifecycle benefits would likely be slightly less than this for the Caltrain Enhanced Growth Scenario (due to slightly lower service levels than the 2040 Baseline Growth Scenario), it is likely that the lifecycle benefits would be greater than the lifecycle costs for the revised project, resulting in a BCR score that would exceed 1.0.

Ultimately, with the significantly lower capital costs and with large benefits still accruing due to substantial increases in Caltrain service on the corridor, we would strongly expect that the

Enhanced Growth Scenario's BCR score would exceed 1.0, thus addressing the BCR Evaluation's flagged performance issue.

### **Guiding Principles Evaluation**

In the qualitative Guiding Principles Evaluation completed by MTC, all three of Caltrain's projects were flagged for two of the five Guiding Principles that were developed for MTC's Horizons process. The flags were received for "Diverse – does the project displace lower-income residents or divide communities (as a direct impact of project construction)?" and "Vibrant – does the project directly eliminate jobs?" It is our understanding that all three of the projects received these performance flags for these Guiding Principles because each of them included grade separation projects as part of their suite of capital investments on the corridor. In discussions with MTC staff, we learned that the assessment assumed that construction of the grade separation projects would result in direct displacement of at least 100 low income people and 100 jobs across the Caltrain corridor – thus resulting in the performance flags for Diverse and Vibrant Guiding Principles.

While the strategies to address these performance issues are discussed below, we would like to highlight several conceptual and methodological concerns about MTC's original assessment for the Guiding Principles. It is important to note that the vast majority of the grade separation projects that were included in the three previously submitted projects are not required by State or federal law, but have been self-identified as a high priority for many of the communities along the Caltrain corridor; in fact, many of the communities have made clear that these grade separation projects are essential to supporting greatly expanded rail service along the Caltrain corridor. It is our understanding that the many benefits of grade separation projects were largely not captured in MTC's modeling nor considered in the Guiding Principles Evaluation – and these benefits are the primary reason that many communities have prioritized these large capital projects, and thus why they were included in the long-range investment plans for the three projects. This includes benefits like improved travel times for surface transportation modes as well as rail travel, improved transit reliability, reduced congestion for vehicular traffic, reduced air pollutants and greenhouse gas emissions, improved pedestrian and bicycle connectivity, etc.

Uncaptured benefits aside, we would also suggest that it is too early in the planning process to make a conclusive assessment about any grade separation project's effects on low-income residents and jobs. It is possible that displacement of residents could occur with construction of these potential future grade separation projects, but at this point in time, the demographics of any potentially displaced residents are unknown. Similarly, it is difficult to assess these potential future projects' net impact on jobs, because while it is possible that some jobs may be displaced as a result of constructing grade separation projects, these large construction projects also bring many high quality jobs to local communities. Indeed, these potential displacement impacts on jobs and residents would be identified and efforts to address any issues would be included in the collaborative, extensive community planning process that each grade separation project undergoes on the corridor. For these reasons, it is difficult to make a final determination that grade separation projects would conclusively raise performance issues with the Diverse and Vibrant Guiding Principles as defined by MTC.

Because all three of Caltrain's previously submitted projects did receive these performance flags for Diverse and Vibrant Guiding Principles in MTC's evaluation, however, we believe it is important to propose strategies for addressing these performance concerns. First, the Enhanced Growth Scenario does not include any grade separation projects in its suite of capital investments. That said, grade separation projects are important to many of the communities

along the Caltrain corridor, and many cities are actively planning for grade separation projects in the coming decades; therefore, they remain part of Caltrain's Long-Term Service Vision. To that end, Caltrain is committed to supporting cities in community-based planning processes for each grade separation project along the corridor; this collaborative, extensive community planning process will be critical to ensuring the projects have minimal displacement impacts to both residents and jobs along the corridor, as well as to ensuring that the many benefits that result from these projects are maximized for the corridor's communities and the region.

Additionally, it is important to note that the Caltrain Board of Directors very recently adopted a Rail Corridor Use Policy and a Transit-Oriented Development Policy, providing the agency with high-level policy guidance that is supportive of additional development along the Caltrain corridor, especially affordable housing. In the planning processes for the Rail Corridor Use Policy and Transit-Oriented Development Policy, the Caltrain Board also recognized that there could be opportunities to integrate development projects directly into future grade separation projects, which is an option that the agency is committed to exploring through the capital planning processes for future projects. Ultimately, Caltrain is supportive of the future provision of additional development projects in its corridor communities, which could provide new physical space for residents and jobs and could help counter any potential future displacement impacts to jobs and low-income residents that could occur as a result of grade separation projects along the corridor. To that end, in addition to planning for individual grade separations, Caltrain is also planning to undertake a comprehensive, corridor-wide grade separation strategy. This comprehensive study has already been funded and will begin in 2020. This process will allow Caltrain to consider issues of development opportunities, displacement, and construction impacts from a deliberative, policy-based perspective on a corridor-wide basis.

In these ways, the Caltrain Enhanced Growth Scenario and the agency's other committed policy and planning process approaches address the performance concerns raised by MTC for "Diverse" and "Vibrant" Guiding Principles.

### **Equity Evaluation**

In its Equity Evaluation for the project performance assessment, MTC rated projects as "advances," "even," or "challenges" for equity scores. Caltrain's three previously submitted projects all scored either "even" or "challenges" in each of the three Futures that were evaluated through the Horizons/Plan Bay Area 2050 process. We understand that projects that received a score of "challenges" equity were determined to have project benefits that skewed towards higher income individuals, while "even" equity scores were given to projects that were determined to have an even distribution of benefits to all income groups. In conversations with MTC staff, we understood that Caltrain's projects received "challenges" equity scores because the agency has generally higher fares, its ridership skews towards higher income demographic groups, and the geography of the railroad and the demographics of the Caltrain corridor communities mean that the benefits from Caltrain's three projects accrue in higher income communities.

Similar to the Guiding Principles Evaluation, before discussing proposed strategies to address the performance issues, we wish to highlight a concern with the project performance assessment approach that contributed to Caltrain's projects receiving equity performance concerns. We would question whether incorporating existing fare structures into the equity analysis process is a methodologically sound approach. Because Caltrain does not currently have a dedicated source of funding, the agency is highly dependent on the farebox to fund operations, and this fact has driven much of the Caltrain Board's decision-making regarding fares. Ultimately, for transit systems in the Bay Area, fares are a funding and revenue tool, and

introducing these into the equity analysis creates an inherent bias against certain types of systems and proposed projects. More specifically, it creates a bias against systems and projects that have been forced to address funding issues through fares today. Our concern is that many of the other proposed projects in the region that were included in the project performance assessment are too “new” and speculative to have worked through realistic funding plans, and the project performance assessment may have been overly and unwarrantedly optimistic about the assumed fares and related equity concerns for these other projects. In other words, our concern is that Caltrain projects may have received a flag for equity performance issues related to fares, while other proposed projects may not have received the same treatment, because they may not be in a similar current funding situation as Caltrain, or because they may not be far enough along in the planning process to have developed a realistic funding plan and identified the role of fares in funding future operations.

Even if fares were excluded from the project performance assessment for equity, however, all three of Caltrain’s previously submitted projects would have still received equity performance issues, and we believe it is important to propose strategies to address these concerns.

Beginning with actions that the agency is taking today to improve equity, Caltrain is working closely with three other transit operators and MTC to lead the region in actively addressing fare equity concerns by piloting a regional means-based fare program, Clipper START. Through this program, which will commence in spring 2020, Caltrain will be offering a 20 percent discount to eligible participants in the pilot program, and the intended effect from Caltrain’s participation is to make the railroad more accessible and affordable to lower income transit riders in the region. Additionally, Caltrain is actively participating along with other operators and MTC in the newly launched Regional Fare Coordination and Integration Study, which aims to identify strategies to increase transit ridership and create a more seamless user experience on the region’s transit systems. While the fare strategies and recommendations from this study are still forthcoming, Caltrain is fully committed to participating in the study and exploring implementation of improvements that would increase transit ridership and improve the user experience across the region.

Separately from those efforts, we are working on an equity analysis as part of the Caltrain Business Plan to look for additional opportunities to make the railroad more equitable and accessible to all our community members. While still underway, preliminary results from this equity analysis indicate that one leading strategy that would be very effective in attracting additional minority and low income passengers to Caltrain would be to change the current concentration of train service in the peak commute periods by offering more off-peak service. The Caltrain Enhanced Growth Scenario would accomplish this as soon as 2022 with a service plan that extends the length of the peak period windows, increases the number of trains operating in off-peak service windows, and increases the total number of trains running each day, resulting in a more equitable service than today. These service improvements would only be enhanced in the late 2020s, when the Enhanced Growth Scenario plans to grow to 8 trains per peak hour per direction, thus delivering even more equity improvements for the railroad.

Preliminary results from the equity analysis that is underway for the Business Plan also indicate that Caltrain’s low income and minority passengers are particularly likely to use transit to connect to and access the Caltrain system. Transit connections to other operators remain a challenge for the railroad today, due to its highly individualized service patterns in each direction and concentration of service in the peak period windows. Improving transit connectivity is another important opportunity to make Caltrain more accessible and attractive to low-income and minority passengers. As soon as 2022, the Enhanced Growth Scenario would accomplish this by creating a more standardized schedule for the trains with a repeating, clockface pattern

and symmetrical services in both the north-bound and south-bound directions. Not only will this more standardized schedule be more user-friendly, it will also allow for improved connections with the rest of the region's rail and transit network, including better bus integration throughout the whole system. On a related note, it is anticipated that with the Enhanced Growth Scenario in the Caltrain Business Plan, we will recommend focusing access improvements on non-auto modes at the stations, which are the modes of station access and egress that are more likely to be used by lower income passengers.

Lastly, as noted above, the Caltrain Board of Directors very recently adopted a Transit-Oriented Development Policy. This high-level policy document contains goals and strategies that support provision of affordable housing along the Caltrain corridor, including requiring Caltrain-led residential development projects to provide affordable housing on site. Per the adopted policy, residential development projects on the agency's property will be required to offer at least 30 percent of units on-site at below-market rents – one of the highest on-site requirements of any transit agency in the country. Caltrain is showing leadership on the equity front by requiring that in each project, at least 10 percent of units be targeted to households with incomes of no more than 50 percent of Area Median Income (AMI), at least 10 percent of units be targeted to households with incomes of no more than 80 percent of AMI, and at least 10 percent of the units be targeted to households with incomes of no more than 120 percent of AMI. The adopted policy also directs the agency to partner with developers to leverage other sources of affordable housing and to explore creative ways to utilize smaller opportunity sites along the Caltrain corridor for affordable housing. With this recently adopted policy, Caltrain is continuing to show leadership and commitment to equity by supporting the creation of more affordable communities along the Caltrain corridor.

In summary, Caltrain is endeavoring to create a more equitable transit system through a variety of programs, strategies, and policy approaches, as well as through the quality of its service in the Enhanced Growth Scenario project, ultimately addressing the underlying equity concerns that caused Caltrain's three projects to receive "performance flags."




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*Department of Transportation*

**Plan Bay Area 2050: Draft Blueprint Framework – City of San José Comments on BART extension from Diridon to Cupertino Project**

City of San José staff would like to provide a revised project submission for inclusion in the Final Blueprint for Plan Bay Area 2050. We believe this submittal addresses all concerns raised by MTC during the Project Performance Assessment and can more readily be accommodated within a fiscally constrained Regional Transportation Plan.

Our revised project for Plan Bay Area 2050 will deliver many benefits to the region, including but not limited to, increased capacity to support transit ridership growth and reduced automobile dependence, vehicle-miles travel, and GHG emissions at significantly lower costs than the previously submitted project. The City of San Jose proposes to change the transportation technology used for the is project. Instead of a BART extension, we propose this extension be built as a Light Rail connection or cheaper technology. The revised cost estimates are based on a Light Rail implementation. This proposal is in line with the multi-jurisdictional (City of Cupertino, City of Santa Clara, and City of San Jose) submission to the MTC’s Horizons Transformative Transportation projects process.

As MTC continues to plan for the future of the Bay Area’s transportation network with Plan Bay Area 2050, we would request that MTC include the **BART extension from Diridon to Cupertino** project, renamed as the Stevens Creek line, (“Project”) in its Final Blueprint. In the attached memo, we have provided additional information about the Project, as well as our comments and strategies regarding performance issues that were flagged during MTC’s Horizons/Plan Bay Area Project Performance Evaluation process.

Lastly, we would like to again express our appreciation to MTC staff for their collaborative approach to the significant undertaking of Plan Bay Area 2050. City of San José appreciate MTC’s partnership and are happy to provide further information or discuss this Project with MTC to support its review as needed.

Sincerely,  
  
 John Ristow  
 Director of Transportation  
 City of San Jose



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Sincerely,

John Ristow  
 Director of Transportation  
 City of San Jose

**Revised Project Submission to MTC - Strategies to Address Performance Flags**

In the MTC’s Project Performance Assessment, the project performed well in some metrics (Guiding Principles and equity scores), but also received flags for performance issues related to the Benefit-Cost Ratio Evaluation. The Project is found to have a benefit-cost ratio of less than one for all three futures scenarios. City of San Jose staff have identified that high capital costs for the previously submitted project is the key contributor to the lower benefit-to-cost ratio and to the “low-performing” status of the project as it was previously defined:

<b>BART Extension Diridon to Cupertino – Previously Submitted Project</b>								
<b>Capital Cost</b>	<b>Annual O&amp;M</b>	<b>Lifecycle Cost</b>	<b>Lifecycle Benefits</b>			<b>Benefit-Cost Ratio</b>		
			RT	CG	BF	RT	CG	BF
<b>\$13.0B</b>	\$0.1B	\$12.1B	\$1.1B	\$2.9B	\$5.1B	<b>0.09</b>	<b>0.24</b>	<b>0.42</b>

City of San José’s revised project addresses the aforementioned performance issues by:

**1. Refining the capital costs estimates for the project**

The updated capital investments total approximately **\$1.6 billion**, a fraction of the capital cost previously associated with the project. This new capital cost estimate is derived from an ongoing grade-separated LRT projects in Santa Clara County (LRT extension to Eastridge).

By MTC’s calculations, the project had lifecycle benefits in the range of \$1-5 billion (variable by Future), and with the significantly lower capital costs, it is likely that the lifecycle benefits would be greater than the lifecycle costs for the revised project, resulting in a **BCR score that would exceed 1.0 in at least two of the planning horizons.**

Furthermore, we believe project cost could be even lower. In Fall 2019, the City of San José and its partner City of Cupertino, City of Santa Clara and, VTA received information from 23 transit solution providers via a Request for Information (RFI)<sup>1</sup>, about how new technologies, business and operational practices, and project delivery methods can introduce grade-separated mass transit infrastructure and operations at significantly lower cost than traditional transit projects. A preliminary review conducted by an external engineering consultant shows that the Project’s estimated capital cost would range between \$20 and \$50 million per mile for a total of approximately **\$0.16 to \$0.4 billion** for the 8-mile corridor. This is only 1 to 10 percent of the capital

<sup>1</sup> <https://www.sanjoseca.gov/your-government/departments-offices/transportation/transit/airport-diridon-stevens-creek-connector>

cost estimate used in the Project Performance Assessment (\$13 billion). With this significantly lower cost estimate, it is likely that the lifecycle benefits would be greater than the lifecycle costs for the revised project, resulting in a **benefit-cost ratio of more than 1.0 in all future scenarios**.

## 2. Providing a strong local and county funding commitment

Valley Transportation Authority (VTA) has allocated \$500 million in its Capital Budget to construct High Capacity Transit Corridors in Santa Clara County. It is assumed this Program will contribute **\$200 million** to the project and the allocated budget would be the primary funding source for the Project's estimated capital cost as defined above.

## 3. Implementing Focused Growth Strategies in Downtown and West San José

Downtown population assumptions should also be updated, increasing the potential ridership and benefit of the project (Downtown West development has proposed to add land uses for a total of 14,740 new residents and as many as 30,450 new jobs). The City has a General Plan that establishes a policy framework to promote high-density and diverse land uses in Downtown San Jose. To implement this policy framework, the City adopted the **Downtown Strategy 2040 Plan**<sup>2</sup> in 2018 to bring in as many as 43,000 residents and 92,000 jobs in Downtown, an intensification level that is much higher than assumed in the Project Performance Assessment. In fact, over the past two years since the adoption of the plan, more than half of the planned residential and commercial capacity have already been entitled or in the pipeline.

The **West San José Multimodal Transportation Improvement Plan** (MTIP) will develop a multimodal transportation network that effectively promotes access, navigability, and sustainable mobility, for all users within the West San José Urban Villages area. The Plan is expected to be completed by December 2020 and will be developed using a robust transportation project evaluation framework to advance implementation of multimodal projects including transportation system improvements and transportation demand management strategies. The Plan will include implementation strategies and the identification of funding sources.

In addition, the City adopted the **VMT Transportation Analysis Policy**<sup>3</sup> in 2018 to attract and facilitate transit-oriented development in San José. The VMT policy also promotes equity and

<sup>2</sup> <https://www.sanjoseca.gov/your-government/departments/planning-building-code-enforcement/planning-division/environmental-planning/environmental-review/active-eirs/downtown-strategy-2040>

<sup>3</sup> <https://www.sanjoseca.gov/your-government/departments-offices/transportation/planning-policies/vehicle-miles-traveled-metric>

diversity by including an affordable housing screening criteria to streamline the development review process for restricted affordable, transit-supportive residential projects.

Furthermore, the City is in the process of updating its **development parking ordinance**, with the expectation to remove its current parking minimum requirements in 2021. The City is also developing a **Downtown Transportation Plan** with the goal of significantly increasing the sustainable transportation mode share by 2040. As the number of automobile traffic demand in Downtown is anticipated to drop from historical trends, the City is confident that future ridership on the extension from Diridon to Cupertino, along with the associated lifecycle benefits, would exceed the Project Performance Assessment projections.

#### 4. Coordinating a Multijurisdictional Vision for the Corridor

As part of the Horizon's Transformative Transportation projects process the multi-jurisdictional group of City of Cupertino, City of Santa Clara, VTA, and City of San Jose submitted proposals for the transit connection. This same group, with the addition of the County of Santa Clara, are continuing that collaboration through the Stevens Creek Corridor Vision Study that will create a common vision for high capacity transit within a complete streets' environment that will transform the Stevens Creek/West San Carlos corridor into a more comfortable, efficient, and safe option for those travelling by foot, bicycle, and transit. This additional study supports and builds upon the forthcoming recommendations from VTA's Strategic Plan for Advancing High Capacity Transit Corridors.



*Department of Transportation*

**Plan Bay Area 2050: Draft Blueprint Framework – City of San José Comments on Downtown San José LRT Subway Project**

City of San José staff would like to provide a revised project submission for inclusion in the Final Blueprint for Plan Bay Area 2050. We believe this submittal addresses all concerns raised by MTC during the Project Performance Assessment and can more readily be accommodated within a fiscally constrained Regional Transportation Plan.

Our revised project for Plan Bay Area 2050 will deliver many benefits to the region, including but not limited to, increased capacity to support transit ridership growth, and reduce automobile dependence, vehicle-miles travel, and GHG emissions.

As MTC continues to plan for the future of the Bay Area’s transportation network with Plan Bay Area 2050, we would request that MTC include the **Downtown San José LRT Subway** project (“Project”) in its Final Blueprint. A project that greatly increase the speed and attractiveness of the LTR system in Downtown San Jose as well as the entire LTR system in San Jose In the attached memo, we have provided additional information about the Project, as well as our comments and strategies regarding performance issues that were flagged during MTC’s Horizons/Plan Bay Area project performance evaluation process.

Lastly, we would like to again express our appreciation to MTC staff for their collaborative approach to the significant undertaking of Plan Bay Area 2050. City of San José appreciate MTC’s partnership and are happy to provide further information or discuss this Project with MTC to support its review as needed.

Sincerely,

  
John Ristow  
Director of Transportation  
City of San Jose

**Revised Project Submission to MTC - Strategies to Address Performance Flags**

In the MTC’s Project Performance Assessment, the Project performed well in some metrics (Guiding Principles and Equity Assessment) but received flags for performance issues related to the Benefit-Cost Ratio Assessment. The Project is found to have a benefit-cost ratio of less than one for two out of the three future scenarios.

<b>Downtown San José LRT Subway – Previously Submitted Project</b>							
<b>Capital Cost</b>	<b>Lifecycle Cost</b>	<b>Lifecycle Benefits</b>			<b>Benefit-Cost Ratio</b>		
		RT	CG	BF	RT	CG	BF
<b>\$2.4B</b>	<b>\$1.9B</b>	<b>\$0.2B</b>	<b>\$0.3B</b>	<b>\$2.5B</b>	<b>0.1</b>	<b>0.2</b>	<b>1.3</b>

City of San José staff have identified two factors that contribute to the “low-performing” status of the project as it was previously defined:

- Low accessibility benefits; and
- Low transit crowding benefits.

City of San José’s revised project addresses the aforementioned performance issues by:

**1. Implementing Focused Growth Strategies in Downtown San José**

The City has a General Plan that establishes a policy framework to promote high-density and diverse land uses in Downtown San Jose. To implement this policy framework, the City adopted the **Downtown Strategy 2040 Plan**<sup>1</sup> in 2018 to bring in as many as 43,000 residents and 92,000 jobs in Downtown, an intensification level that is much higher than assumed in the two scenarios with BCR lower than one (Rising Tides and Clean and Green). In fact, over the past two years since the adoption of the plan, more than half of the planned residential and commercial capacity have already been entitled or in the pipeline.

<b>PBA 2050 Horizon</b>	<b>Service Population</b>
Clean & Green (2050)	91,778
Rising Tides (2050)	65,274
<b>City San José</b>	
Existing + Pipeline (near future)	106,340
Downtown Strategy (2040)	134,812
Downtown Strategy (2040) + update to Diridon Area Station Plan	183,318

<sup>1</sup> <https://www.sanjoseca.gov/your-government/departments/planning-building-code-enforcement/planning-division/environmental-planning/environmental-review/active-eirs/downtown-strategy-2040>

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In addition, the City adopted the **VMT Transportation Analysis Policy**<sup>2</sup> in 2018 to attract and facilitate transit-oriented development in Downtown. The VMT policy also promotes equity and diversity by including an affordable housing screening criteria to streamline the development review process for restricted affordable, transit-supportive residential projects in Downtown.

Furthermore, the City is in the process of updating its **development parking ordinance**, with the expectation to remove its current parking minimum requirements in 2021. The City is also developing a **Downtown Transportation Plan** with the goal of significantly increasing the sustainable transportation mode share by 2040. As the number of automobile traffic demand in Downtown is anticipated to drop from historical trends, the City is confident that future ridership on the Downtown San José LRT system, along with the associated lifecycle benefits, would exceed the Project Performance Assessment projections.

## 2. Providing a strong local and county funding commitment

Valley Transportation Authority (VTA) has allocated **\$500 million** in its Capital Budget to construct System-wide improvements that prioritize transit to improve speed and reliability, including light rail grade separation/undergrounding.

### Conclusion

The local policies changes that will increase ridership both at the Airport and in Downtown and local funding, merit reclassification of the project and inclusion in the final Blueprint Plan. VTA's local funding, by reducing the share of regional funds, would significantly increase the Benefit-Cost Ratio across all scenarios. Secondly, local policy implementation of the Downtown Strategy 2040 Plan will increase the service populations increasing project benefits across all scenarios. Finally, as MTC acknowledges in the Project Performance report, this project will bring transit reliability and grade separation benefits that the Travel Model 1.5 was not able to capture. Combined these funding, policy commitments, and unmodeled benefits merit reclassification of the project and inclusion in the final Blueprint Plan.

<sup>2</sup> <https://www.sanjoseca.gov/your-government/departments-offices/transportation/planning-policies/vehicle-miles-traveled-metric>

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*Department of Transportation*

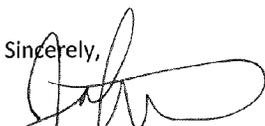
**Plan Bay Area 2050: Draft Blueprint Framework – City of San José Comments on San José Airport People Mover Project**

City of San José staff would like to provide a revised project submission for inclusion in the Final Blueprint for Plan Bay Area 2050. We believe this submittal addresses all concerns raised by MTC during the Project Performance Assessment and can more readily be accommodated within a fiscally constrained Regional Transportation Plan.

Our revised project for Plan Bay Area 2050 will deliver many benefits to the region, including but not limited to, increased capacity to support transit ridership growth and reduced automobile dependence, vehicle-miles travel, and GHG emissions at significantly lower costs than the previously submitted project.

As MTC continues to plan for the future of the Bay Area’s transportation network with Plan Bay Area 2050, we would request that MTC include the **San José Airport People Mover** project (“Project”) in its Final Blueprint. In the attached memo, we have provided additional information about the Project, as well as our comments and strategies regarding performance issues that were flagged during MTC’s Horizons/Plan Bay Area Project Performance Evaluation process.

Lastly, we would like to again express our appreciation to MTC staff for their collaborative approach to the significant undertaking of Plan Bay Area 2050. City of San José appreciate MTC’s partnership and are happy to provide further information or discuss this Project with MTC to support its review as needed.

Sincerely,  
  
 John Ristow  
 Director of Transportation  
 City of San Jose

**Revised Project Submission to MTC - Strategies to Address Performance Flags**

In the MTC’s Project Performance Assessment, the Project performed well in some metrics (Guiding Principles) but received flags for performance issues related to the Benefit-Cost Ratio Assessment and Equity Assessment. The Project is found to have a benefit-cost ratio of less than one for all three future scenarios. The Project receives an equity score of “challenges” for the Clean and Green future scenario and “even” for the other two future scenarios.

City of San José staff have identified four factors that contribute to the “low-performing” status of the project as it was previously defined:

- High capital costs;
- Low accessibility benefits;
- Low transit crowding benefits; and
- Equity (project benefits skewed toward higher-income individuals).

<b>San José Airport Connector – Previously Submitted Project</b>							
<b>Capital Cost</b>	<b>Lifecycle Cost</b>	<b>Lifecycle Benefits</b>			<b>Benefit-Cost Ratio</b>		
		RT	CG	BF	RT	CG	BF
<b>\$1.2B</b>	\$1.4B	\$0.4B	\$0.6B	-\$0.7B	<b>0.3</b>	<b>0.4</b>	<b>-0.5</b>

City of San José’s revised project addresses the aforementioned performance issues by:

**1. Refining the capital costs estimates for the project**

In Fall 2019, the City of San José and its partner City of Cupertino, City of Santa Clara and, VTA received information from 23 transit solution providers via a Request for Information (RFI)<sup>1</sup>, about how new technologies, business and operational practices, and project delivery methods can introduce grade-separated mass transit infrastructure and operations at significantly lower cost than traditional transit projects. A preliminary review conducted by an external engineering consultant shows that the Project’s estimated capital cost would range between \$20 and \$50 million per mile for a total of approximately **\$60 to \$150 million** for the 3-mile connection between the Airport and Downtown San José. This is only 5 to 13 percent of the capital cost estimate used in the Project Performance Assessment (\$1.2 billion). With this significantly lower cost estimate, it is likely that the lifecycle benefits would be greater than the

<sup>1</sup> <https://www.sanjoseca.gov/your-government/departments-offices/transportation/transit/airport-diridon-stevens-creek-connector>

lifecycle costs for the revised project, resulting in a **benefit-cost ratio of more than 1.0 in at least two of the future scenarios.**

**2. Implementing Focused Growth Strategies in Downtown San José**

The City has a General Plan that establishes a policy framework to promote high-density and diverse land uses in Downtown San Jose. To implement this policy framework, the City adopted the **Downtown Strategy 2040 Plan**<sup>2</sup> in 2018 to bring in as many as 43,000 residents and 92,000 jobs in Downtown, an intensification level that is much higher than assumed in the Project Performance Assessment. In fact, over the past two years since the adoption of the plan, more than half of the planned residential and commercial capacity have already been entitled or in the pipeline.

<b>PBA 2050 Horizon</b>	<b>Service Population</b>
Clean & Green (2050)	91,778
Rising Tides (2050)	65,274
<b>City San José</b>	
Existing + Pipeline (near future)	106,340
Downtown Strategy (2040)	134,812
Downtown Strategy (2040) + update to Diridon Area Station Plan	183,318

In addition, the City adopted the **VMT Transportation Analysis Policy**<sup>3</sup> in 2018 to attract and facilitate transit-oriented development in Downtown, The VMT policy also promotes equity and diversity by including an affordable housing screening criteria to streamline the development review process for restricted affordable, transit-supportive residential projects in Downtown.

Furthermore, the City is in the process of updating its **development parking ordinance**, with the expectation to remove its current parking minimum requirements in 2021. The City is also developing a **Downtown Transportation Plan** with the goal of significantly increasing the sustainable transportation mode share by 2040. As the number of automobile traffic demand in Downtown is anticipated to drop from historical trends, the City is confident that future ridership on the San Jose Airport People Mover, along with the associated lifecycle benefits, would exceed the Project Performance Assessment projections.

**3. Implementing the San José Airport Master Plan**

<sup>2</sup> <https://www.sanjoseca.gov/your-government/departments/planning-building-code-enforcement/planning-division/environmental-planning/environmental-review/active-eirs/downtown-strategy-2040>

<sup>3</sup> <https://www.sanjoseca.gov/your-government/departments-offices/transportation/planning-policies/vehicle-miles-traveled-metric>

Ridership projects from the airport should be revised upwards. On February 28, 2020, the City adopted an update to the San Jose Airport Master Plan. The Master Plan forecasts that the number of air passengers will increase from 12.5 million in 2017 to 17.6 million in 2027 (40 percent growth) and to 22.5 million in 2037 (80 percent growth). A direct, high-capacity mass transit connection between the Airport and the regional rail stations in Downtown is therefore key to not only supporting the City's vehicle-miles-traveled and modal share goals but also advancing the Plan Bay Area 2050's goal of a more affordable, connected, diverse, healthy and vibrant Bay Area.

#### 4. **Providing a strong local and county funding commitment**

Valley Transportation Authority (VTA) has allocated **\$200 million** in its Capital Budget to construct a dedicated guideway connection between Mineta San Jose International Airport and Downtown San Jose. The allocated budget would be the primary funding source for the Project's estimated capital cost as defined above.

#### **Conclusion**

The combined project changes and local policies to reduce costs, increase service population, increase airport demand, and provide local funding, merit reclassification of the project and inclusion in the final Blueprint Plan. VTA's local funding is sufficient to cover the revised project costs. Even if the revised costs were evaluated as regional funds the Benefit-Cost Ratio would exceed 1.0 for both the "Rising Tides" and "Clean and Green" scenarios. Finally, local policy implementation of both the Downtown Strategy 2040 Plan and San José Airport Master Plan will increase the service populations and travel demand for the two endpoints of the line, increasing project benefits across all scenarios. Combined these cost, funding, and policy changes merit reclassification of the project and inclusion in the final Blueprint Plan.



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*Brad Paul*  
Deputy Executive Director,  
Local Government Services

April 10, 2020

Therese W. McMillan  
Metropolitan Transportation Commission  
375 Beale Street Suite 800  
San Francisco, CA 94105

RE: Regional Express Bus Project Performance in Plan Bay Area 2050 – Project ID 6020

Dear Ms. McMillan:

This letter is in response to the Plan Bay Area 2050 Project Performance Assessment (PPA) findings for the Regional Express (ReX) Bus Network + Optimized Express Lane Network (Project ID 6020). While the PPA found that the top ten ReX express routes and top ten ReX link routes generated more ridership than BART's systemwide ridership today, the sprawling network had several shortcomings, including a Diverse Guiding Principle red flag and underperforming benefit-cost ratios and ridership equity. I am writing to convey the proposed and ongoing adjustments to address these underperformance issues, note areas where the proposal aligns with other Plan Bay Area (PBA) 2050 strategies, and flag areas for further recommended research and analysis.

The ReX Network PPA was performed after an MTC-convened panel of transportation experts selected it as a "transformative project finalist." The ReX proposal sought to present a comprehensive vision for a frequent network of express buses operating on a continuous and comprehensive network of managed lanes and connected with frequent and fast transit on local roadways to provide seamless access to many of the region's key destinations. The proposal was focused on multiple goals, including increasing person-throughput, reducing vehicle miles of travel, increasing transit ridership, and vastly expanding the number of Bay Area residents and jobs served by fast, frequent, and affordable high-capacity public transportation. Several assumptions underpinned the ReX vision:

- Continuing to widen the region's highways is unsustainable. We must focus on increasing person-throughput and reducing vehicle miles of travel.
- The region will continue to pursue a comprehensive and seamless managed lane network which will allow the region's freeway infrastructure to deliver fast and reliable travel times for priority modes such as bus and high occupancy vehicles, without gaps in the managed lane network.
- Dramatically improved speed, reliability, and ridership to many local and regional destinations can be achieved with infrastructure that enables passengers to board freeway-based buses.

- Regional express bus services can achieve strong ridership growth without relying on, but not precluding, park and ride facilities through major improvements in last mile travel options and efficient and frequent local transit connections.
- Rapid growth in bus and vehicle electrification will improve the sustainability of freeway-based bus travel while simultaneously reducing noise and pollution in freeway adjacent environments, thus making ReX hubs attractive for transit-oriented development.

Staff from TransForm, SPUR, and MTC, and several consultants (hereinafter, the ReX working group) have prepared a revised ReX proposal with a focus on delivering strong equity and benefit/cost performance. The ReX working group believes the revised routes can serve as a phase one for future routes. In addition to optimizing benefit/cost and equity, the revised proposal coordinates routes with existing express lanes, those under construction, as well as with future, planned implementation of managed lanes. The proposal will be further revised based on sketch tool performance analysis and more detailed cost estimation.

#### ***Revised Scope to Improve Performance and Decrease Costs***

The ReX working group's revised proposal takes the following actions to improve project performance and reduce costs:

- Select three high-performing routes that connect six of the Bay Area's nine counties with new connections or that respond to current transit capacity challenges;
- Select ReX routes that predominantly coincide with segments where express lanes are existing or proposed and coordinate the start of express bus service with managed lane implementation for the route corridor;
- Highlight routes with demonstrated exceptional ridership in the PPA;
- Emphasize routes that serve Communities of Concern and system policies that attract diverse ridership;
- Avoid costly connecting infrastructure such as proposed tunnels and flyovers, either by eliminating destinations that demand such infrastructure or through alternative routing;
- Eliminate stops not justified by ridership and propose less costly stop and station infrastructure where alternatives can deliver similar travel time performance;
- Adjust proposed peak and daytime-off-peak frequencies depending on projected demand; and
- Proposes future work with local operators and jurisdictions on initial planning for identification of transit-oriented development and improvements to last mile connections through existing/new local service and other evolving last mile options, prioritizing Communities of Concern.

#### ***Revised Scope to Address PBA 2050 Diverse Guiding Principle***

The original ReX proposal included some routes that required significant right-of-way acquisition resulting in home displacement. The new Phase I proposal will not need new right-of-way acquisition and therefore, not impose any dislocation of homes.

### ***Equity Focus***

The ReX working group targeted its proposal to prioritize express bus routes and advance regional express bus policies that maximize the proportion of minority and low-income riders choosing to use regional express bus services. Working group actions to ensure this proposal advances Plan Bay Area 2050 equity goals are summarized as follows:

- Prioritize routes that serve Communities of Concern and add additional stops to increase access in and near Communities of Concern.
- Prioritize long service spans to ensure express bus travel is not focused on traditional peak period commute trips, thereby increasing the likelihood that such services will benefit transit-dependent and low-income populations.
- Institute means-based fares on all regional express bus routes offering a minimum of 50% fare discounts for qualifying riders.
- Fund free or reduced cost transfers between express bus service and other transit services that serve basic non-commute needs such as access to markets and health care. Also establish discount programs for other last-mile service options.
- Prioritize, when possible, the implementation of routes that are projected to have higher minority and low-income ridership.
- After service is in operation, monitor ridership trends by income and race to modify services and programs to maintain strong ridership and better meet the needs of minority and low-income riders.
- Support Plan Bay Area 2050 affordability strategies under review in the Draft Blueprint, as noted below.

### ***Plan Bay Area Concepts***

Subject to results of PBA 2050's draft Blueprint analysis, the ReX working group will support high-performing policies and projects including the following strategies, which collectively advance equity and safety of the entire transportation system as well as complementing regional express bus:

- *Eventual transition to congestion pricing on all freeway lanes in corridors with robust transit options.* Regional express bus services will provide an affordable means of travel as freeway pricing expands. Revenues from performance-based freeway pricing may provide a vital source of funding for future expanded local and express bus operations and last mile connections. In addition, reduced congestion associated with all lane tolling will dramatically expand flexibility and reduce costs for freeway-based bus stops and stations.
- *Lowering the speed limit to 55 miles per hour on freeways.* Lower freeway speeds not only promote fuel efficiency, they improve safety for the general driving population, and for buses which typically travel more slowly than other freeway traffic. Freeway-based buses will especially benefit from slower speed limits as they make lane changes required to access in-line and freeway-adjacent stops.

- *Expansion of local bus services and non-motorized modes.* Improved local bus services and bicycle and pedestrian improvements along high demand corridors will compliment express bus service by providing new ways for riders to access freeway based express bus stops/stations and could reduce the need for park and ride facilities.
- *Integrated transit fares and payment platforms, including means-based discounts.* Better integration of transit fares and payments will be of particular benefit for regional express bus services, where a large proportion of trips are expected to require multiple trip links. Means-based discounts will make express bus (and all transit) more accessible and equitable.
- *Transit oriented development, including reduction of barriers to affordable housing near transit and in areas of high opportunity and increasing affordable housing in the region.* These strategies are an important complement to transportation investments such as new regional express bus. They include allowing a greater mix of housing types and densities in growth areas, reducing barriers to affordable housing near transit, funding affordable housing protection and preservation and production. PBA 2050 policies that support greater densities near frequent transit will strongly support express bus performance.
- *Vehicle Electrification.* New regional express bus routes are proposed to be operated with electric buses. In addition, proposed investments in efficient freeway-based transit services anticipates reduced air pollution and noise in freeway corridors, consistent with growing electrification of the region's vehicle fleet.

#### ***Related Recommendations and Research Needs***

While we believe the proposed changes address the primary concerns raised through the PPA, the working group's efforts to adapt the original proposal generated a number of additional recommendations for PBA including that further research and consideration be given to BRT/express hybrid routes, planning for station areas and last-mile connections at ReX stops, and other worthwhile corridors for investment. Multiple agency plans are underway or have been finalized that are not in ReX Phase I but would provide complementary express bus service, including in the I- 680 and Marin-Sonoma 101 corridors.

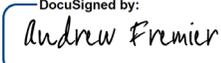
Phase II could be an expansion of ReX routes or include some of the high performing routes in the original ReX proposal that took advantage of Bus Rapid Transit concepts to increase ridership and provide equity solutions.

Plan Bay Area 2050 must support significant transit ridership growth and more equitable mobility investments. It should also focus on maximizing the congestion reduction and mobility benefits of our existing infrastructure, including our highways, rather than expansion of these facilities. The high cost and long delivery times for rail investments require new concepts for high capacity transit delivery for some corridors. Regional express bus organized around the region's growing network of managed lanes is a promising strategy; deliverable at

reasonable cost; and adaptable for uncertain future economic conditions, growth patterns, travel choices, and technological evolution. We look forward to hearing your thoughts and discussing this updated proposal. Please contact Jim Macrae with questions.

Please find attached the new proposed ReX project with supporting documentation.

Sincerely,

DocuSigned by:  


8584B49D6DE64E9...  
Andrew Fremier  
Deputy Executive Director, Operations  
MTC

Attachments:

- Project map
- Detail project list
- Capital costs
- Operations and Maintenance costs – 2 versions



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Deputy Executive Director, Operations

*Brad Paul*  
Deputy Executive Director,  
Local Government Services

April 3, 2020

Ms. Therese McMillan  
Metropolitan Transportation Commission  
375 Beale Street Suite 700  
San Francisco, CA 94105

RE: Bay Area Forward: Plan Bay Area 2050 Letter of Commitment

Dear Ms. McMillan:

Bay Area Forward is premised on the concept of the "Columbus Day Effect": the finding that a modest 3 to 5 percent reduction in traffic demand leads to a significant reduction in delay, such as on administrative holidays like Columbus Day/Indigenous People Day. A similar effect can be achieved by improving and maximizing the operational efficiency and capacity of the existing infrastructure. Bay Area Forward achieves this effect by pursuing near-term, low-cost operational strategies on freeways and arterials, combined with transportation demand management strategies such as express bus transit, bicycle/pedestrian, and innovative new shared mobility strategies to achieve mode shift away from vehicular traffic demands. Proven by the success of the on-going Bay Bridge, Richmond-San Rafael and Dumbarton Forward initiatives, Bay Area Forward will continually improve freeway and arterial operations at a regional level.

As part of the Plan Bay Area 2050 project performance assessment, Bay Area Forward received a very high benefit-cost ratios (b/c) in all three futures, ranging between 6 b/c and 9 b/c. However, the assessment flagged challenges under the Equity and in the Healthy guiding principles because of the potential increase in vehicle miles of travel (VMT). Because the performance assessment focused primarily on evaluating the freeway ramp and arterial components of Bay Area Forward, the assessment did not capture the other key strategies included in Bay Area Forward that would offset the equity and health challenges such as transit-priority lanes, higher occupancy managed lanes, travel demand management and bike/pedestrian solutions.

The MTC and Bay Area Toll Authority team is committed to deliver high-impact and cost effective regional strategies that manages congestion, curbs VMT, increases shared mobility, and supports transportation equity. We are committed to advancing Plan Bay Area 2050's equity and healthy principles in our projects, as outlined below:

### Equity

Bay Area Forward programs will incorporate transportation demand management (TDM) strategies to target low-income users, target investments in low-income communities/Communities of Concern, and target program outreach to low-income

communities/Communities of Concern. Specifically, these strategies can take the following form:

- Support means-based fares for express bus services
- Target limited-English proficient and low-income employees to onboard on commute platforms and provide rewards for sustainable trips
- Provide higher levels of incentives for low-income commuters in a carpool incentive program
- Prioritize e-bike/micro-mobility investments in Communities of Concern. Target incentives for such programs towards low-income users or provide greater incentives for them
- For a program supporting large employers with parking management tools and strategies, prioritize support for those employers with greater portions of low-income employees or employees commuting from communities of concern
- Partner with and fund community-based organizations to conduct program outreach

Our team is currently exploring and incorporating some of these approaches to improve equitable outcomes through Napa Valley Forward, Richmond-San Rafael e-bike commuter program, and MTC SHIFT (supporting employers with parking management tools). We will continue to iterate and build upon these approaches as these programs launch, or as these programs continue or expand to other geographic areas.

In addition, our team is committed to explore prioritizing implementation of Bay Area Forward improvements to serve MTC Communities of Concern, on corridors most heavily travelled by users from these communities.

Moreover, Bay Area Forward includes several transit, high-occupancy vehicle (HOV), and bicycle/pedestrian strategies that would improve the equity performance of the program.

These types of strategies expand options or provide improved options for low-income households with low vehicle ownership rates who tend to carpool, take transit, bike and walk more. Specific strategies include the following:

- Extend HOV lanes
- Modify HOV policies or implement other HOV strategies (e.g. extend hours, change occupancy, modify access control)
- Bridge metering with HOV lane priority
- Bus on shoulder
- Transit signal priority and bus queue jump lanes
- Integrated corridor management that integrates commuter parking and carpool strategies or data
- New or enhanced express bus routes serving MTC Communities of Concern
- First/last-mile improvements, with a higher priority to focus on MTC Communities of Concern

### **Healthy**

To address emissions and collisions from increased vehicles miles of travel, an array of HOV, transit, bike, shared mobility, and micro-mobility strategies will provide improved and expanded

options not to drive alone. In addition to the strategies described above under Equity, new or enhanced express bus services and commuter parking will provide more options for commuters to share rides. Additionally, pedestrian and bicycle facility improvements, gap closures, and other improvements such as pedestrian or bicycle-actuated signals along regional corridors like the Richmond-San Rafael Bridge and Dumbarton Bridge corridors will provide safety benefits. Other improvements include first and last mile strategies to/from parking constrained transbay transit stations or other freeway or bridge corridors.

A number of freeway and arterials technology and operations improvements included in Bay Area Forward will significantly improve traffic safety, such as adaptive ramp metering, connected and autonomous vehicle applications including as queue warning, speed harmonization and coordinated adaptive cruise control.

### **Other Plan Bay Area Projects**

Other high-performing policies and projects under consideration in Plan Bay Area that would support the Bay Area Forward project performance include:

- Transit Fare Integration: Eliminating transfer penalties will reduce barriers to making transfers, which would facilitate express bus ridership and may provide opportunities to streamline some existing express bus services.
- Demand-Based Tolling on All Freeways with Means-Based Tolls: This strategy would reduce GHG emissions and would complement HOV, express bus, and TDM strategies.

### **Funding**

Anticipated sources of funding for Bay Area Forward include:

- One Bay Area Grants 3 – Federal STP/CMAQ
- Regional Measure 2
  - \$8M for Bay Bridge Forward (2016, projects are on-going)
- Regional Measure 3
  - \$75M available for Richmond-San Rafael Bridge Access Improvements in Contra Costa County
  - \$130M available for Dumbarton Corridor Improvements
  - \$140M available for Core Capacity Transit Improvements
  - \$150M available for San Francisco Bay Trail/Safe Routes to Transit
- BATA Toll Bridge Rehabilitation
- SAFE

We recommend that the Commission include Bay Area Forward as part of Plan Bay Area 2050's Final Blueprint, as we are committed to implementing regional strategies under Bay Area Forward and advance the core goals, principles and vision of Plan Bay Area 2050.

Sincerely,

DocuSigned by:

*Andrew Premier*

At 8584B49D6DE64E9...

Deputy Executive Director, Operations

RESOLUTION AFFIRMING THE SAN FRANCISCO COUNTY TRANSPORTATION AUTHORITY'S COMMITMENT TO SUPPORTING EFFORTS TO IMPROVE COST-EFFECTIVENESS AND TO ADVANCE EQUITY IN PROJECT DEVELOPMENT AND DELIVERY FOR CERTAIN SAN FRANCISCO PROJECTS PROPOSED FOR INCLUSION IN PLAN BAY AREA 2050

WHEREAS, Every four years, the Metropolitan Transportation Commission and the Association of Bay Area Governments (MTC/ABAG) are required to develop and adopt a Regional Transportation Plan and Sustainable Communities Strategy, called Plan Bay Area or PBA, to guide the region's long-term transportation investments and establish land-use priorities across all nine counties; and

WHEREAS, The next PBA, known as PBA 2050, must establish a strategy to meet the region's greenhouse gas emission reduction targets and accommodate the region's projected household and employment growth through 2050; and

WHEREAS, As Congestion Management Agency (CMAs) for San Francisco, the Transportation Authority is responsible for coordinating with local and regional partner agencies to establish San Francisco's priorities for inclusion in PBA; and

WHEREAS, On July 23, 2019, through Resolution 20-06, the Transportation Authority approved goals to guide San Francisco's work on PBA 2050 (Attachment 1) and throughout the process, staff has worked in close coordination with local transportation agencies and regional transit providers to develop San Francisco's input into PBA 2050; and

WHEREAS, On April 14, 2020, through Resolution 2043, the Transportation Authority approved a draft list of projects from San Francisco to submit to MTC for inclusion in PBA 2050; and

WHEREAS, Consistent with MTC/ABAG guidance, most projects are included in PBA through programmatic categories and typically, projects are only listed as specific named projects when required to do so for air quality conformity purposes (e.g. for major transit or roadway expansion projects); and

WHEREAS, As one part of its process, MTC staff conducted a project

performance assessment on large, regionally transformative projects, defined as projects over \$250 million in capital costs and that increase capacity on the region's transportation system; and

WHEREAS, Among other aspects, the project performance assessment included a cost/benefit analysis and identification of equity challenges defined as projects for which MTC's model shows high- and moderate-income residents receiving more transportation benefits than low-income residents; and

WHEREAS, Based on its project performance assessment, MTC staff identified high-profile, regionally-significant projects that have potential cost-effectiveness and/or equity challenges including the six San Francisco project priorities shown in Attachment 2; and

WHEREAS, As a prerequisite for these projects to seek regional discretionary funds, MTC has requested that each CMA affirm through a board action its commitment to supporting efforts to improve cost-effectiveness and to advance equity in the project development and delivery phases; and

WHEREAS, Transportation Authority staff worked closely with project sponsors including the San Francisco Municipal Transportation Agency, San Francisco Public Works, the Transbay Joint Powers Authority, Caltrain, and MTC to document existing and future efforts to improve cost-effectiveness and to advance equity for the projects as shown in Attachment 2; and

WHEREAS, MTC staff also asked the eight agencies collaborating on the Regional Express Lanes project, which includes the US-101/I-280 Express Lanes and Bus Project, to approve a joint letter making commitments to improve the project's greenhouse gas emission, cost effectiveness, and equity performance (Attachment 3); and

WHEREAS, The Citizens Advisory Committee was briefed at its July 22, 2020 meeting, on the Transportation Authority's commitment to supporting efforts to improve cost-effectiveness and advance equity in project development and delivery for certain San Francisco projects proposed for inclusion in PBA 2050 as described in Attachments 2 and 3; now; therefore, be it

RESOLVED, That the Transportation Authority hereby affirms its commitment to working collaboratively with project sponsors, MTC and other agencies and to supporting efforts to improve cost-effectiveness and to advance equity in project development and delivery for certain San Francisco projects proposed for inclusion in PBA 2050 as described in Attachments 2 and 3; and, be it further

RESOLVED, That the Executive Director is directed to submit this resolution to MTC/ABAG and other interested parties.

Attachments:

- Attachment 1 - San Francisco Goals for PBA 2050
- Attachment 2 - Efforts to Improve Cost Effectiveness and Advance Equity for Certain San Francisco Project Priorities Proposed for PBA 2050
- Attachment 3 - Joint Letter of Project Performance Commitments for the Regional Express Lanes Project

Goals	Notes
1. Ensure that all San Francisco projects and programs that need to be in PBA 2050 in order to advance are included	<p>Projects need to be included in PBA 2050 if they:</p> <ul style="list-style-type: none"> <li>• Need a federal action (e.g. federal environmental approval) or wish to seek state or federal funds before 2025 when the next PBA will be adopted</li> <li>• Trigger federal air quality conformity analysis (e.g. projects that change capacity of transit or major roadways)</li> </ul>
2. Advocate strongly for more investment in transit state of good repair to support existing communities and new growth	Coordinate with the “Big 3 Cities” accepting most of the job and housing growth in PBA and regional and local transit operators
3. Advocate for increased shares of existing revenues for San Francisco priorities (partial list at right)	<ul style="list-style-type: none"> <li>• BART Core Capacity</li> <li>• Better Market Street</li> <li>• Blended High Speed Rail/Caltrain service from San Jose to the Transbay Transit Center</li> <li>• Downtown Rail Extension</li> <li>• Geary BRT</li> <li>• Muni fleet and facilities expansion</li> <li>• Muni Forward</li> <li>• Vision Zero (support eligibility for MTC fund programs)</li> <li>• Placeholders for transit expansion planning (e.g. west side rail, 19<sup>th</sup> Avenue/M-Line, Central Subway extension, etc.)</li> </ul>
4. Advocate for new revenues for transportation and housing, and continue advocacy for San Francisco priorities in new expenditure plans	<ul style="list-style-type: none"> <li>• Regional transportation measure(s)</li> <li>• Regional housing measure(s)</li> <li>• State road user charge (monitor pilots)</li> <li>• Federal surface transportation bill</li> </ul>
5. Support performance-based decision-making	<ul style="list-style-type: none"> <li>• Support transparent reporting on strategy and project performance evaluation metrics, including impact on vehicles miles travelled</li> <li>• Continue advocating for a better way of capturing of transit crowding in PBA evaluation, key to transit core capacity issues</li> <li>• Advocate for discretionary funds for high-performing and regionally significant San Francisco projects</li> </ul>
6. Support coordinated transportation and land use planning	<ul style="list-style-type: none"> <li>• Advocate for regional policies to support jurisdictions accepting their fair share of housing and employment growth, especially in areas with existing or planned transit service to support new growth</li> <li>• Advocate for more funds to support Priority Development Area planning</li> </ul>

Goals	Notes
	<ul style="list-style-type: none"> <li>Support update to the Regional Transit Expansion Policy to reflect appropriate land use requirements as a prerequisite for regional endorsement and investment</li> </ul>
7. Focus on equity	<ul style="list-style-type: none"> <li><b>Access to transportation</b> – Late Night Transportation Study, Prosperity Plan</li> <li><b>Affordability</b> – MTC Means-Based Pilot, BART university pass/discount</li> <li><b>Communities of Concern</b> – Continue Community Based Transportation Planning grant program, more funds for Lifeline Transportation Program</li> <li><b>Housing/Displacement</b> – Work with the Board, Mayor, SF agencies, etc. to develop recommendations for planning, production, and preservation of affordable housing and to prevent/mitigate displacement</li> <li><b>Vision Zero</b> – SFTP 2040 demonstrated that communities of concern experience disproportionately high rates of pedestrian and bike injuries. Continue to advocate for regional Vision Zero policies and investments.</li> </ul>
8. Support comprehensive, multimodal planning for the region’s network of carpool and express lanes	Develop a regional carpool/express lane vision that includes regional/local express transit service
9. Continue to show leadership in evaluating and planning for emerging mobility solutions and technologies	To the extent PBA 2050 addresses this topic, provide input to shape and lead on regional policy on emerging mobility services and technologies, including shared mobility and autonomous vehicles
10. Provide San Francisco input to shape and lead on other regional policy topics	<ul style="list-style-type: none"> <li>Sea level rise/adaption</li> <li>Economic performance and access to jobs</li> </ul>

Project	PBA 2050 Project Flags	Efforts to Improve Cost Effectiveness and Advance Equity	Next Steps	Supports Regional Strategies
<b>Downtown Caltrain Extension (DTX)</b>	Low benefit/cost score	California High Speed Rail (HSR) interregional benefits not included in scoring	Continue working with regional and state partners on HSR	<ul style="list-style-type: none"> <li>• Make strategic modernization &amp; expansion investments in public transit</li> <li>• Extend the regional rail network</li> <li>• Build a new Transbay rail crossing</li> </ul>
		Caltrain's Enhanced Service Growth plan provides more service to support the DTX and reduces crowding	Support Caltrain's Enhanced Growth plan in PBA 2050 along with the DTX	
		Connection to a potential second transbay tube improves score	Support regional planning for a second transbay tube	
The Downtown Extension Project Expert Panel made a series of recommendations to improve the project and project delivery. The DTX MOU partners have committed to examining the project's cost-effectiveness consistent with that report, including considering cost reduction, phasing and project delivery strategies and strengthening funding plans to identify an initial operating segment that can be constructed in the next 10-12 years.	All of the DTX MOU have committed to continue to support improvements to improve project benefits and reduce cost.			
	Equity challenge	Caltrain is participating in the Regional Means-Based Fare Program Pilot to provide a 50% discount to low-income transit riders (as approved by the PCJPB)	Support the Regional Pilot and the advancement of other recommendations from Caltrain's Equity Analysis	
<b>Treasure Island Tolling and Mobility Program</b>	Increases travel costs for lower income residents	In December 2019, the TIMMA Board approved a toll exemption for disproportionately low-income current Treasure Island residents	Continue seeking program funding to offset toll rates for all users. Significant local (developer fees, etc), state (AHSC), and federal (ATCMTD) funding has been committed to the program.	<ul style="list-style-type: none"> <li>• Enable seamless mobility with unified trip planning and fare programs</li> <li>• Reform regional transit fare policy</li> <li>• Implement per-mile tolling on congested freeways with transit alternatives</li> </ul>
		The SFMTA has the most robust means-based transit fare pass programs in the region, and is participating in MTC's regional means-based pilot program	SFMTA's transit fare programs are in the agency's adopted budgets	

Project	PBA 2050 Project Flags	Efforts to Improve Cost Effectiveness and Advance Equity	Next Steps	Supports Regional Strategies
	Equity challenge	An affordability program will include subsidized multi-operator transit passes and discounts to services such as car and bike share for low-income residents	Continue planning, anticipating final program adoption in late 2020	<ul style="list-style-type: none"> <li>• Build a complete streets network</li> <li>• Advance regional Vision Zero policy</li> <li>• Advance low-cost transit projects</li> <li>• Make strategic modernization &amp; expansion investments for public transit</li> </ul>
<b>Downtown Congestion Pricing Program</b>	Increases travel costs for lower income residents	One of the goals of the current study is to advance equity by improving health and transportation access for disadvantaged communities. The current study's metrics to evaluate the equity performance of program alternatives include travel costs, with the target of maintaining travel costs as a percent of household income for low-income households.	Continue the Downtown Congestion Pricing Study, with additional outreach to traditionally under-represented communities. The SFCTA's study is scheduled to be completed in early 2021.	<ul style="list-style-type: none"> <li>• Implement per-mile tolling on congested freeways with transit alternatives</li> <li>• Build a complete streets network</li> <li>• Advance regional Vision Zero policy</li> <li>• Make strategic modernization &amp; expansion investments for public transit</li> </ul>
		The SFMTA has the most robust means-based transit fare pass programs in the region, and is participating in MTC's regional means-based pilot program	SFMTA's transit fare programs are in the agency's adopted budgets	
	Equity challenge	The current study's metrics to evaluate the equity performance of program alternatives include several metrics to ensure program benefits are focused on low-income travelers and Communities of Concern.	Continue the Downtown Congestion Pricing Study, with additional outreach to traditionally under-represented communities. The SFCTA's study is scheduled to be completed in early 2021.	

Project	PBA 2050 Project Flags	Efforts to Improve Cost Effectiveness and Advance Equity	Next Steps	Supports Regional Strategies
<p><b>Regional Express Lanes and Bus Program, SF Link</b></p> <p><i>See Attachment 3 for Joint Letter of Project Performance Commitments for the Regional Express Lanes Project which will include the San Francisco Link.</i></p>	<p>Low benefit/cost score</p>	<p>The Transportation Authority is only considering lane conversions, not expansions, for our express lanes facility, specifically, a “bus on shoulder” and “take a lane” option for the northbound and southbound directions, respectively. Project studies are also looking at other strategies to decrease implementation and operating costs.</p>	<p>MTC recommends that PBA 2050 include a Bay Area Express Lanes project definition which includes the SF link. Depending on how the draft performs with respect to GHG emissions, MTC may revise the project definition to exclude segments outside of SF that aren't lane conversions.</p>	<ul style="list-style-type: none"> <li>• Implement per-mile tolling on congested freeways with transit alternatives</li> <li>• Advance low-cost transit projects</li> <li>• Make strategic modernization &amp; expansion investments for public transit</li> <li>• Build carpool lanes &amp; address interchange bottlenecks</li> <li>• Advance regional Vision Zero policy</li> </ul>
	<p>Increases travel costs for lower income residents</p>	<p>The SFCTA remains committed to including local Muni express bus service as part of the US-101/I-280 Express Lanes and Bus Project, and have included increased service in the project definition currently under environmental review.</p>	<p>Transportation Authority Board requested staff conduct a project Equity Study which will engage adjacent neighborhoods and vulnerable communities to help design project pricing features and policies to ensure equitable outcomes</p>	
		<p>The SFMTA has the most robust means-based transit fare pass programs in the region, and is participating in MTC's regional means-based pilot program. The SFCTA also supports the development of integrated transit fare payment platforms needed to implement affordability policies and provide incentives for using transit, ridesharing, and first/last mile services.</p>	<p>SFMTA's transit fare programs are in the agency's adopted budgets.</p>	

Project	PBA 2050 Project Flags	Efforts to Improve Cost Effectiveness and Advance Equity	Next Steps	Supports Regional Strategies
	Equity challenge	<p>SFMTA considers this project to be an Equity Strategy priority, as they have identified an existing equity gap for the 8X and 14X Muni bus lines due to unreliable bus performance in this highly congested corridor</p> <p>The SFCTA participates in the regional working group for the Bay Area Express Lanes Network, which recognizes that equity is a key issue for the network.</p>	<p>Increased service on the Muni 14X and 8X routes, which currently use the facility, and as well as the future Hunters Point and Candlestick Point express routes would benefit transit users in the numerous communities of concern in southeast San Francisco, whose residents tend to be lower-income than the city's population overall.</p> <p>The working group is supportive of means-based tolling as one of various strategies in PBA 2050 that could address equity. In the near-term the working group supports a BAIFA-led pilot of means-based tolling. The working group is also identifying how the network can best support existing and potential future public transit services, including a regional express bus network and complementary transit that serves low income travelers. Other equity strategies the working group is exploring include targeted incentives (e.g. toll credit for transit use), active mobility projects/programs, and job access improvements for communities of concern.</p>	

Project	PBA 2050 Project Flags	Efforts to Improve Cost Effectiveness and Advance Equity	Next Steps	Supports Regional Strategies
<b>Geary Boulevard Transportation Improvements</b>	Equity challenge	The Muni Equity Strategy identifies the 38/38R (Geary) route as an Equity line, serving a neighborhood with high percentages of households with low incomes and people of color.	Support the SFMTA's Muni Service Equity Strategy, an ongoing effort to improve service performance in eight Equity Strategy neighborhoods.	<ul style="list-style-type: none"> <li>• Build a complete streets network</li> <li>• Advance regional Vision Zero policy through street design and reduced speeds</li> <li>• Advance low-cost transit projects</li> <li>• Build a next generation bus rapid transit network</li> <li>• Make strategic modernization &amp; expansion investments for public transit</li> </ul>
		The SFMTA has the most robust means-based transit fare pass programs in the region, and is participating in MTC's regional means-based pilot program	SFMTA's transit fare programs are in the agency's adopted budgets	
<b>Better Market Street</b>	Project not assessed but flagged for high cost	<p>Better Market Street is a pre-eminent example of how to build a complete street that prioritizes the movement of people over the movement of vehicles, with the goal of achieving zero traffic fatalities along the facility. It is a multi-agency project to transform 2.2 miles of Market Street by enhancing safety and accessibility, improving transit reliability, replacing aging infrastructure, and revitalizing the corridor's streetscape.</p> <p>SFMTA and SF Public Works are the lead agencies on this project, and are currently analyzing the benefits of the Market Street Quick Build / Car-free Market, and are evaluating the first phase of Better Market Street. The agencies also plan to revise the project's budget and scope following this assessment, including value engineering and phasing recommendations.</p>	The Transportation Authority is a funding partner for this project, and will continue to work with SFMTA and SF Public Works to improve the project's benefits while decreasing costs.	<ul style="list-style-type: none"> <li>• Build a complete streets network</li> <li>• Advance regional Vision Zero policy through street design and reduced speeds</li> <li>• Make strategic modernization &amp; expansion investments for public transit</li> <li>• Increase existing rail capacity and frequency by modernizing the network</li> </ul>

Attachment 3 - Joint Letter of Project Performance  
Commitments for the Regional Express Lanes Project

August 1, 2020

Therese W. McMillan  
Executive Director  
Metropolitan Transportation Commission  
375 Beale Street Suite 700  
San Francisco, CA 94105

RE: Bay Area Express Lanes Project Performance in Plan Bay Area 2050

Dear Ms. McMillan:

This letter is in response to the Plan Bay Area 2050 Project Performance Assessment (PPA) findings for the Regional Express Lanes Network. The PPA indicated a few performance shortcomings for the Regional Express Lanes Network, including underperforming benefit-cost ratios, equity and GHG scores. We are writing to convey the regional plan to address these underperformance issues.

For the last year, a working group consisting of Bay Area Express Lanes partners has met to develop an Express Lanes Strategic Plan. This group is collaborating to shape the future of the Express Lanes Network, consistent with the vision and goals of Plan Bay Area 2050. We believe it shows promising benefits if integrated cost-effectively with transit, affordability, and other Plan Bay Area programs. The working group recently developed network scenarios that integrate Plan Bay Area goals and presented them to the MTC Operations Committee in May for Commissioner feedback. Having implemented the recommended changes and presented to the MTC Operations Committee in June, the working group will soon submit a revised Regional Express Lane Network for inclusion into Plan Bay Area 2050.

This letter demonstrates the working group's commitment to improving the network's cost effectiveness, equity and GHG reduction performance while meeting Federal and State operational requirements by: prioritizing segments that support transit/carpooling and provide seamless travel, incorporating projects that utilize conversion of existing right of way over expansion where possible, committing to a means-based toll discount pilot, and implementing public engagement best practices. In addition to revising the Network for Plan Bay Area 2050, the group plans to develop a series of white papers over the summer of 2020 to inform policies and future project development. The outcomes of these white papers along with the revised Regional Express Lanes Network will be documented in a final Regional Express Lanes Strategic Plan at the end of 2020. Some highlights of work to date and upcoming work include:

**Increasing Benefits; Decreasing Costs**

The working group is revising the Regional Express Lanes Network to reflect:

- Segments that can more realistically be built in the next 15 years as well as the next 30 years based on available funds, including local funding commitments to project development and construction, and financing. For example, the costly 580/680 and 680/80 direct connectors most likely will not fit within the funding envelope for this period.
- Segments that support existing and potential future public transit services that advance the equity and GHG goals outlined in the Strategic Plan.

### Attachment 3 - Joint Letter of Project Performance Commitments for the Regional Express Lanes Project

- Prioritization of HOV lane and general-purpose lane conversions (pending changes in legislation and traffic impact analysis) over construction of new lanes to reduce per-mile capital cost and the risk of induced demand/GHG. For example, Ala-580, SF-101/280, SCL 680/280 and SM-101 will evaluate take-a-lane and/or shoulder lane strategies as potential alternatives during the environmental process to evaluate impacts on GHG emissions and operations. Where new lanes are added, it may be possible to use paved right of way to reduce costs.

#### **Local Funding**

Express lanes bring considerable resources to the table to fund their construction, operations and maintenance. This sets them apart from other transportation management strategies.

- The express lanes operating and maintenance costs are covered by express lanes toll revenue and require no regional funds to keep the express lanes in a state of good repair.
- There is \$300 million in capital funding set aside for the express lanes network in Regional Measure 3. MTC is proposing a framework for local RM3 express lane funding to leverage state and federal funding to the greatest extent possible.
- The county transportation agencies plan to leverage over \$80 million in local funds to build the Regional Express Lanes Network.
- Express lane toll revenue can be used to finance the buildout of the network. The financial analysis used in Plan Bay Area 2040 demonstrated the ability to finance up to 60% of the total capital cost. In addition, several projects already in operation and under construction have financed a share of their capital costs with future toll revenue.

#### **Green House Gas**

To decrease GHG emissions, the working group is focusing on projects and programs that increase mode shift and average vehicle occupancy, including:

- Focusing on early delivery of projects with a high potential for express bus ridership and identifying policies that support future express bus service.
- Exploring the use of express lane revenues to support investments in express buses, mobility hubs and other investments to increase bus ridership and carpooling.
- Prioritizing projects that convert existing travel lanes (general-purpose and HOV lanes) to mitigate induced vehicles miles traveled and achieve GHG reduction goals. A white paper will be developed that looks in more detail on the impacts of interregional express lanes segments and dual express lane segments on VMT/GHG.

#### **Equity**

The working group recognizes that equity is a key objective for the Express Lanes Network and is supportive of means-based tolling as one of various strategies in Plan Bay Area 2050 that could address equity. In the near-term, the working group supports a BAIFA-led pilot of means-based tolling on BAIFA's express lanes. At the same time, San Mateo and SFCTA are undertaking studies to better understand and advance equity. These studies may result in additional pilots that complement BAIFA's pilot.

Attachment 3 - Joint Letter of Project Performance  
Commitments for the Regional Express Lanes Project

**Plan Bay Area Concepts**

In addition, the express lane partner agencies support high-performing policies and projects in the Plan Bay Area 2050 Draft Blueprint:

- Eventual transition to congestion pricing on all freeway lanes in corridors with robust transit options. Express lanes can be a stepping stone to more extensive congestion pricing strategies. Prior to such implementation, further investigation is needed to better understand how congestion pricing on freeways may be implemented and the potential impacts on express lane operations as well as local roadways and transit.
- Lowering the speed limit to 55 miles per hour on freeways to improve safety. During congested periods the general-purpose lanes typically flow well below that speed, and so the express lanes could still offer a travel time and reliability advantage.
- Expansion of local bus services and non-motorized modes that serve shorter trips of all types and thus complement express lanes and express bus service, which tend to serve longer, largely commute trips.
- Integrated transit fares and payment platforms, which can help implement affordability policies and provide incentives for using transit, ridesharing and first and last mile services.

As a region, we are committed to implementing an Express Lane Network that serves the community and the surrounding environment equitably, cost-effectively and sustainably in order to advance the goals of Plan Bay Area 2050. We look forward to hearing your thoughts and discussing this further. If you have any questions about this format, please contact Jim Macrae at [jmacrae@bayareametro.gov](mailto:jmacrae@bayareametro.gov).

Sincerely,

ALAMEDA COUNTY TRANSPORTATION  
COMMISSION

BAY AREA INFRASTRUCTURE FINANCE AUTHORITY

\_\_\_\_\_  
Tess Lengyel, Executive Director

\_\_\_\_\_  
Andrew B. Fremier, Deputy Executive Director,  
Operations

\_\_\_\_\_  
Date:

\_\_\_\_\_  
Date:

Attachment 3 - Joint Letter of Project Performance  
Commitments for the Regional Express Lanes Project

SAN FRANCISCO COUNTY TRANSPORTATION  
AUTHORITY

SAN MATEO CITY/COUNTY ASSOCIATION OF  
GOVERNMENTS (C/CAG)

\_\_\_\_\_  
Tilly Chang, Executive Director

\_\_\_\_\_  
Sandy Wong, Executive Director

\_\_\_\_\_  
Date:

\_\_\_\_\_  
Date:

SAN MATEO COUNTY TRANSPORTATION  
AUTHORITY

SAN MATEO COUNTY EXPRESS LANES JOINT  
POWERS AUTHORITY (SMCEL-JPA)

\_\_\_\_\_  
Jim Hartnett, Executive Director

\_\_\_\_\_  
Jim Hartnett, Executive Council

\_\_\_\_\_  
Date:

\_\_\_\_\_  
Date:

SAN MATEO COUNTY EXPRESS LANES JOINT  
POWERS AUTHORITY (SMCEL-JPA)

SANTA CLARA VALLEY TRANSPORTATION  
AUTHORITY (VTA)

\_\_\_\_\_  
Sandy Wong, Executive Council

\_\_\_\_\_  
Deborah Dagang, Director of Planning and  
Programming

\_\_\_\_\_  
Date:

\_\_\_\_\_  
Date:

## Memorandum

### AGENDA ITEM 8

**DATE:** July 9, 2020

**TO:** Transportation Authority Board

**FROM:** Maria Lombardo - Chief Deputy Director

**SUBJECT:** July/14/2020 Board Meeting: Affirm the San Francisco County Transportation Authority's Commitment to Supporting Efforts to Improve Cost-Effectiveness and to Advance Equity in Project Development and Delivery for Certain San Francisco Projects Proposed for Inclusion in Plan Bay Area 2050

<p><b>RECOMMENDATION</b>   <input type="checkbox"/> Information   <input checked="" type="checkbox"/> Action</p> <p>Affirm the San Francisco County Transportation Authority's commitment to supporting efforts to improve cost-effectiveness and to advance equity through project development and delivery for certain San Francisco projects proposed for inclusion in Plan Bay Area (PBA) 2050.</p> <p><b>SUMMARY</b></p> <p>For the past two years, the Metropolitan Transportation Commission and the Association of Bay Area Governments (MTC/ABAG) have been undergoing a multi-step process to establish land use, transportation, economic, and environmental strategies and investments to meet ambitious greenhouse gas (GHG) reduction targets through the year 2050 as part of development of PBA 2050. As the Congestion Management Agency (CMA) for San Francisco, the Transportation Authority establishes San Francisco's transportation priorities for inclusion in PBA. In April, the Transportation Authority Board approved a draft fiscally constrained project list to submit to MTC for inclusion in PBA 2050. MTC staff conducted a project performance assessment on a subset of large, regionally transformative projects (e.g., greater than \$250 million). Based on its project performance assessment, MTC staff identified high-profile, regionally significant projects that have potential cost-effectiveness and/or equity challenges including six San Francisco project priorities. As a prerequisite for these projects to seek regional discretionary funds, MTC has requested that each CMA affirm through a board action its commitment to supporting efforts to improve cost-effectiveness and to advance equity in project development and delivery of these projects. Attachments 1 and 2 to the resolution document existing and future efforts to improve cost-effectiveness and to advance equity for the relevant projects.</p>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Fund Allocation</li> <li><input type="checkbox"/> Fund Programming</li> <li><input checked="" type="checkbox"/> Policy/Legislation</li> <li><input type="checkbox"/> Plan/Study</li> <li><input type="checkbox"/> Capital Project Oversight/Delivery</li> <li><input type="checkbox"/> Budget/Finance</li> <li><input type="checkbox"/> Contract/Agreement</li> <li><input type="checkbox"/> Other: _____</li> </ul>
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## BACKGROUND

Every four years, MTC/ABAG are required to develop and adopt a Regional Transportation Plan and Sustainable Communities Strategy, called Plan Bay Area or PBA, to guide the region's long-term transportation investments and establish land-use priorities across all nine counties. The regional agencies adopted the last update in 2017, called PBA 2040.

The next PBA, known as PBA 2050, must establish a strategy to meet the region's GHG emission reduction target and accommodate the region's projected household and employment growth through 2050. It includes a transportation strategy that must only include investments that fit within a reasonable fund estimate, among other requirements.

MTC/ABAG staff began the PBA update effort with Horizon in early 2018, which is a broadly scoped planning effort that explored how economic, environmental, technological, and political uncertainties may create new challenges for the Bay Area over the coming decade. This work is now being used to inform the transportation and land use decisions in PBA 2050 which was officially launched in September 2019.

On July 23, 2019, through Resolution 20-06, the Transportation Authority Board approved goals to guide our work on PBA 2050 shown in Attachment 1 to the draft resolution. Throughout the process, we have worked in close coordination with local transportation agencies and regional transit providers to develop San Francisco's input into PBA 2050.

In our role as the county CMA for San Francisco, the Transportation Authority submitted a draft project and program list for MTC/ABAG's consideration to include in PBA 2050, as approved by the Transportation Authority Board on April 14, 2020. These projects are listed in memo Attachment 2.

**Consistency with PBA.** Consistency with PBA is important from a very practical project development perspective: it is a requirement to receive state and federal funds and certain federal approvals such as a Record of Decision for an environmental document. However, most transportation projects in San Francisco do not need to be listed as stand-alone projects in PBA, only those that significantly change capacity of the transportation system at a regional scale and trigger air quality conformity analysis. The vast majority of projects can be grouped into programmatic categories, which provides flexibility to accommodate new priorities that may arise between quadrennial PBA updates, as well as to deal with unexpected cost increases while keeping within San Francisco's fiscally constrained target. In short, San Francisco's Draft Fiscally Constrained List of Projects and Programmatic Categories provided in Attachment 2 includes:

- Projects—ONLY projects that are required to be listed by MTC/ABAG to comply with air quality conformity analysis needs, and/or have high project costs (e.g. over \$250 million)
- Programmatic categories—the majority of projects are included in these groupings, such as bike and pedestrian infrastructure, safety and security improvements, and planning and engineering work for future transit or roadway projects.

For any new projects that would qualify as regionally significant under MTC/ABAG's definition but are not included on this list, planning and environmental design work could proceed

under one of the programmatic categories until the next PBA is adopted in 2025. For example, this applies to new transportation expansion priorities being identified through the ConnectSF process. Per MTC/ABAG guidance, projects completed by 2021 are not included in the project lists as they are considered part of the baseline.

## DISCUSSION

**MTC Project Performance Assessment.** After collecting the nine Bay Area CMAAs' fiscally constrained project lists, MTC/ABAG staff have begun to develop recommendations for which projects to include in PBA, and for assigning discretionary regional funding (including regional, state, and federal funding not distributed to local jurisdictions via formula) to projects.

One input to this effort, is the project performance assessment MTC conducted on large, regionally transformative projects, defined as projects over \$250 million in capital costs and that increase capacity on the region's transportation systems. Among other aspects, the project performance assessment included a cost/benefit analysis and identification of equity challenges defined as projects for which MTC's model shows high- and moderate-income residents receiving more transportation benefits than low-income residents.

In general, most of the large projects across the region did not perform well due to high costs. For some projects, shortcomings in the way that the regional model and methodology captured benefits further impacted the performance results. Additionally, many projects were flagged for equity concerns because the model showed that high- and moderate-income residents would receive more transportation benefits than low-income residents. We are very supportive of the focus on equity and affordability, but note that the evaluation of San Francisco projects was particularly adversely impacted by factors such as not including Muni's existing means-based fare policies, which are the gold standard in the region, not taking into account San Francisco's higher rent burden in conjunction with higher average income, and not considering the benefits of improved transit reliability. Other limitations of the analysis methodology are noted below for each project.

We worked with project sponsors to support San Francisco's submissions to the project performance assessment process for large, regionally transformative projects. Several of the city's priorities did well in MTC's cost-effectiveness and equity assessments including Muni Forward, Southeast Waterfront Transportation Improvements (to support development in that part of the city), and BART's Core Capacity project. MTC staff recommends those projects be included in PBA and hasn't requested further action at this time. However, several San Francisco projects were flagged through this performance assessment process. These projects and the project performance issues MTC raised are summarized below:

- Downtown Congestion Pricing, Treasure Island Mobility Program, and Regional Express Lanes (including San Francisco's link) were all flagged for equity concerns, due to potential impact of tolling on low-income travelers. The MTC analysis of the Downtown Congestion Pricing project did not reflect the disproportionate impacts of congestion, which the project would help alleviate, on low-income, vulnerable groups in the downtown core including: a) bus rider delay, b) higher rates of severe and fatal traffic collisions, c) exposure to elevated vehicle emissions. The analysis of the

Treasure Island project did not reflect equitable pricing policies such as the existing resident exemption that the Transportation Authority acting in its capacity as the Treasure Island Mobility Management Authority adopted last December. Finally, for the Regional Express Lanes project, Commissioner Ronen has pressed for greater attention to equity impacts and mitigation policies in her capacity on the MTC, and MTC staff have strengthened equity in the project's goals framework, outreach approach and design (e.g. staff propose a means-based toll pilot program). *MTC staff is recommending these projects be included in the plan, given San Francisco's commitment to advancing equity through project design for all three.*

- Geary Bus Rapid Transit was flagged for equity, due to forecasted higher-income population in San Francisco (e.g. so more benefits accrued to higher income people across the region than lower income). *MTC staff is recommending this project be included in PBA, given the corridor's importance in the Muni Equity Strategy, and given Muni's existing means-based transit fare discount programs, which weren't incorporated into its model assumptions.*
- Downtown Caltrain Rail Extension (DTX) was flagged for cost-effectiveness, due to the high project cost, and for equity concerns, based on generally high-income ridership on Caltrain. MTC's analysis did not fully capture the benefits of inter-regional High Speed Rail (though a proxy Caltrain service was assumed), nor the full network benefits of DTX with *both* a New Transbay Rail Crossing and Caltrain/High Speed Rail Enhanced Growth (which we hope will be reflected in PBA. We agree the project cost is high and warrants review per our DTX Peer Review study findings last year. Six agencies including the Transportation Authority and MTC have signed a Memorandum of Understanding (MOU) to work together to, among other objectives, improve the project's cost-effectiveness including considering cost reduction, phasing, and project delivery strategies and strengthening the funding plan. At the same time, Caltrain's board has committed to participating in the Regional Means-Based Transit Pilot Program, including funding a 50% fare discount for low income riders, and to increase midday frequencies supporting non-work travel, which help to address MTC's equity concerns. We have been supporting this at the staff level and Commissioner Walton, in his capacity as a Caltrain Director, has been a strong voice for increasing the affordability of Caltrain for those who need it. *MTC staff recommending including this project in PBA, specifically in Period 2 (2036-2050) of the plan. We are working with the Transbay Joint Powers Authority, Caltrain, other MOU partner agencies (including MTC), and MTC to address the concerns raised, while advocating for including the project in Period 1 (2021-2035) and for a re-affirmation of the project as a regional Federal funding (New Start) priority.*
- Better Market Street was initially selected for MTC's project performance assessment, but ultimately, MTC determined that the regional model was unable to demonstrate the project's benefits such as transit reliability and bike/pedestrian safety and therefore, did not fully evaluate the project. *MTC staff is recommending the project be included as a named project in PBA.*

**Project Commitment Actions:** Earlier this spring, MTC/ABAG asked CMAs to submit letters from staff outlining how local policies, additional project elements, and supportive regional strategies can help improve project performance for this subset of projects identified as having cost-effectiveness and/or equity challenges through MTC's project performance assessment, if agencies are seeking regional discretionary funding. We are highly supportive of efforts to improve cost effectiveness, advance equity and the other PBA goals. We also recognize that this is an ongoing effort that will advance through local planning and project development (and the community engagement that goes along with this) as well as through complementary regional initiatives (e.g. regional means-based fare, seamless transit initiatives).

Earlier this month, MTC/ABAG requested that the CMA boards across the region take action to affirm their agencies' commitments to efforts to improve cost-effectiveness and advance equity for the projects that were evaluated through the project performance assessment and that are seeking regional discretionary funds. Attachment 1 is a table outlining the efforts underway or already in place for each flagged project (listed above), to improve cost-effectiveness and/or advance equity as applicable. The table, developed in collaboration with project sponsors and other partner agencies, also outlines next steps for each project. The Transportation Authority is either a lead or partner agency in the ongoing planning processes for each of these projects and is committed to the ongoing work outlined with the community as well as our partner agencies.

The proposed resolution also includes as an attachment, a joint letter from eight agencies collaborating on the Regional Express Lane Network with commitments in response to the project's performance shortcomings around cost-effectiveness, equity, and greenhouse gas emissions reductions. Through this letter, which will be approved by the governing boards of each signatory, the partners commit to focusing on lane conversion projects over projects that construct new lanes (which is already the case for the San Francisco link), and to prioritizing segments that accommodate express bus services. The partners will also make a commitment to supporting means-based tolling as a possible way to address equity concerns, and to supporting a near-term means-based tolling pilot.

**Transportation Strategies for PBA 2050.** MTC/ABAG have focused PBA 2050 discussions on a series of strategies across four topic areas: Transportation, Housing, Economy, and Environment. Strategies are packages of projects, policies, and programmatic investments that are intended to work together to help PBA 2050 achieve its goals. MTC/ABAG staff are currently studying how these strategies perform in relation to the PBA 2050 guiding principles of Affordable, Connected, Diverse, Healthy, and Vibrant as well as the cross-cutting issues of Equity and Resilience. This includes an analysis of how far these strategies get us toward meeting the region's state GHG reduction goals. Attachment 2 lists the San Francisco projects and programmatic categories submitted to MTC in April, along with the transportation strategy or strategies each supports. The strategies were developed through the 2018-2019 Horizon scenario planning process, which studied a wider range of strategies in three disparate futures. The strategies that performed well, by reducing GHG emissions or improving travel options for Bay Area residents, were recommended for inclusion in PBA 2050. Thus far, MTC/ABAG staff have focused their commission discussions on these strategies, rather than on individual projects or policies, and it is important to demonstrate

how our project priorities are consistent with those strategies to support the city's requests for regional discretionary funding.

**Next Steps.** As they continue to refine the PBA 2050 project list, MTC/ABAG staff are working with the counties and project sponsors to update project information, revenue projections, and needs assessments (for state of good repair investments on local streets and roads, highways and bridges, transit, and ongoing transit operations). We expect to come back to our Citizens Advisory Committee (CAC) and the Transportation Authority Board with a revised list of San Francisco's fiscally constrained projects and programs in the fall. At that time, we will have the benefit of a more complete picture of the draft PBA investment strategy including all of the proposed regional strategies, state of good repair needs and funding, discretionary funding recommendations, other county level projects, and regional programs (e.g. regional means-based fare program) being proposed for PBA 2050.

MTC/ABAG anticipates approving the financially constrained transportation investment strategy by the end of 2020, and then beginning work on an implementation plan. After the environmental review process, the final PBA 2050 will be approved in September 2021. Throughout the remainder of the PBA 2050 process, we will continue to work with the Transportation Authority Board, CAC, our MTC/ABAG representatives, project sponsors, and leaders at the local and regional levels to advocate for inclusion of San Francisco's priorities.

## FINANCIAL IMPACT

There are no impacts on the proposed provisional three-month Fiscal Year 2020/21 budget associated with the recommended action.

## CAC POSITION

The CAC considered this item at its July 22, 2020 meeting and unanimously adopted a motion of support for the staff recommendation.

## SUPPLEMENTAL MATERIALS

- Resolution Attachment 1 – Proposed Resolution affirming the Transportation Authority's commitment to support efforts to improve project cost-effectiveness and advance equity
- Resolution Attachment 2 – Transportation Authority Approved Draft Project and Program List for PBA 2050
- Memo Attachment - San Francisco's Draft Fiscally Constrained PBA 2050 Project and Program List with PBA Strategies

**Attachment - San Francisco's Draft Fiscally Constrained PBA 2050 Project and Program List  
with PBA Strategies**

	Column A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
	PBA 2050 Projects and Programs	Project Sponsor <sup>1</sup>	Operations and Maintenance of the Existing System	Build a Complete Streets Network	Advance Regional Vision Zero Policy through Street Design and Reduced Speeds	Enable Seamless Mobility with Unified Trip Planning and Fare Payments	Reform Regional Transit Fare Policy	Advance Low-Cost Transit Projects	Increase Existing Rail Capacity and Frequency by Modernizing the Network	Extend the Regional Rail Network	Build a New Transbay Rail Crossing	Build an Integrated Regional Express Lane and Express Bus Network	Implement Per-Mile Tolling on Congested Freeways with Transit Alternatives	Improve Interchanges and Address Highway Bottlenecks	Advance Other Regional Programs and Local Priorities
<b>Regional Transit Priorities</b>															
1	Caltrain Downtown Extension, part of the Caltrain Business Plan <sup>4</sup>	TJPA							X	X	X				X
2	Caltrain Enhanced Service Growth <sup>4</sup>	Caltrain					X		X						X
3	BART Core Capacity <sup>5</sup>	BART							X						X
4	Expand SFMTA Transit Fleet - LRV (Core Capacity Program)	SFMTA							X						X
5	Muni Train Control Upgrade (Core Capacity Program)	SFMTA	X						X						X
6	Muni Forward: Core Capacity Rail (Core Capacity Program)	SFMTA							X						X
7	Mission Bay Ferry Landing	Port of SF						X							X
8	Geary Boulevard Improvement Project	SFMTA		X	X			X							X

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9	Van Ness Avenue Bus Rapid Transit	SFMTA		X	X			X							X
10	Transit Corridors Long-Range Planning	SF							X	X	X				X
11	Transit Operations	SF	X												X
12	Transit Preservation and Rehabilitation	SF	X												X
<b>Local Transit Priorities</b>															
13	Muni Forward + Frequency Increase (other)	SFMTA		X	X			X							X
14	Expand SFMTA Transit Fleet - Buses	SFMTA	X					X							X
15	Expand SFMTA Transit Fleet - Facilities	SFMTA	X					X							X
16	San Francisco Late Night Transportation Improvements	SFCTA						X							X
17	Geneva-Harney Bus Rapid Transit	SFMTA		X	X			X							X

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18	Historic Streetcar Extension - Fort Mason to 4th & King	SFMTA						X							X
19	Minor Transit Improvements	SF			X			X							X
20	Transit Operations	SF	X												X
21	Transit Preservation and Rehabilitation	SF	X												X

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<b>Highway Safety and Efficiency Projects</b>															
22	Alemany Roadway Redesign and Ramp Reconfiguration	SFCTA		X	X									X	X
23	Balboa Park Station Area - Closure of Northbound I-280 On-Ramp from Geneva Avenue	SFCTA												X	X
24	Balboa Park Station Area - Southbound I-280 Off-Ramp Realignment at Ocean Avenue	SFCTA			X									X	X
25	Yerba Buena Island (YBI) I-80 Interchange Improvement	SFCTA												X	X
26	Minor Highway Improvements	SF												X	X

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<b>Pricing and Community Re-Investment Programs</b>															
27	Treasure Island Congestion Pricing	SFCTA		X	X	X	X	X				X	X		X
28	Downtown SF Congestion Pricing	SFCTA		X	X	X		X							X
29A	US-101/I-280 Express Lanes	SFCTA				X						X	X		X
29B	US-101/I-280 Regional/Local Express Bus to Support Express Lanes in SF	SFCTA						X				X	X		X
<b>Vision Zero and Complete Streets</b>															
30	Better Market Street Transportation Enhancements	SFPW / SFMTA		X	X										X
31	Bicycle and Pedestrian Program	SF		X	X										X
32	Intersection Improvements	SF		X	X										X

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33	Local Road Preservation and Rehabilitation	SF	X												X
34	Management Systems	SF		X	X										X
35	Minor Roadway Expansions	SF		X	X										X
36	Multimodal Streetscape Improvements	SF		X	X										X
<b>Transportation Investments Supporting Redevelopment and Affordable Housing</b>															
37	Parkmerced Transportation Improvements	SFMTA		X	X			X							X
38	Hunters Pt Shipyard and Candlestick Pt Local Roads	SFPW / OCII		X	X			X							X
39	Southeast Waterfront Transportation Improvements - Phase 1	SFPW / OCII		X	X			X							X

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<b>Programs Supporting Multiple Priorities</b>															
40	Planning and Research	SF		X	X	X	X	X	X	X	X	X	X	X	X
41	Routine Operations & Maintenance	SF	X												X
42	Safety and Security	SF		X				X						X	X
43	Travel Demand Management and Climate Program	SF			X	X		X					X		X
44	Financing Costs	SF	X	X	X	X	X	X	X	X	X	X	X	X	X

1 Project sponsor agencies: SFCTA: San Francisco County Transportation Authority; SFMTA: San Francisco Municipal Transportation Agency; SFPW: San Francisco Public Works; OCII: Office of Community Investment and Infrastructure; TJPA: Transbay Joint Powers Authority; Port of SF: Port of San Francisco; BART: Bay Area Rapid Transit

2 Project costs are displayed in millions of year-of-expenditure dollars.

3 O+M stands for Operations and Maintenance.

4 We are working with Caltrain to seek packaging of the Caltrain Enhanced Service Growth and Downtown Extension projects as part of a complimentary package of projects supporting the Caltrain Business Plan Service Vision.

5 Full BART Core Capacity project cost not included in SF Projects Total; assumes \$50M SF contribution.

PROGRAMMATIC CATEGORIES

PROJECTS named for air quality conformity purposes

## SAN JOAQUIN REGIONAL RAIL COMMISSION

Meeting of July 2, 2020

### STAFF REPORT

#### Item 7

#### ACTION

**Approve a Resolution of the Board of Commissioners of the San Joaquin Regional Rail Commission (SJRRRC) Approving the April 10, 2020 Commitment Letter Submitted by the Tri-Valley – San Joaquin Valley Regional Rail Authority (Authority) and SJRRRC to the Metropolitan Transportation Commission (MTC), Adopting a Phased Approach for the ACE Rail Service Increase Program, and Supporting the ACE Rail Service Increase and Valley Link Programs to be Included in the Fiscally Constrained (Before 2035) MTC Regional Transportation Plan (RTP)**

#### Background:

Staff have been working in partnership with the Tri-Valley – San Joaquin Valley Regional Rail Authority (Authority) to try and get the Altamont Corridor Vision Phase 1, Valley Link, and ACE Rail Service Increase programs included in the Metropolitan Transportation Commission's (MTC's) fiscally constrained Regional Transportation Plan (RTP).

MTC staff's evaluation of the Altamont Corridor Vision Phase 1 and ACE Rail Service Increase Program found these programs had some deficiencies. To be further considered for inclusion in their RTP, MTC required the SJRRRC and the Authority to submit a "Commitment Letter" to MTC by April 10, 2020 in order to boost the performance of the Altamont Corridor Vision Phase 1 and ACE Rail Service Increase Program.

On April 10, the Authority and SJRRRC submitted a joint Commitment Letter to MTC. The letter was signed by the Executive Directors for the Authority and SJRRRC. MTC is further requiring that agency Boards must take action to approve the Commitment Letters by August 2020. Please review the April 10 Authority/SJRRRC Commitment Letter that is included as an attachment for this Board Item.

In the Commitment Letter, the Authority and SJRRRC acknowledged that a phased implementation of the Altamont Corridor Vision Phase 1, Valley Link, and ACE Rail Service Increase programs may be needed depending on the amount of funding available through various potential sources and would work with MTC and other regional partners to determine a phased approach should full funding not be obtained in the short-term.

As a result of the COVID-19 crisis, the \$100 billion FASTER Bay Area transportation measure for the nine-county Bay Area (MTC) region that was anticipated to be on the November 2020 ballot, was postponed indefinitely. SJRRRC and the Authority had been

working together in attempt to get \$2 billion included in the FASTER Bay Area Measure to fund the Bay Area improvements of the Altamont Corridor Vision Phase 1. The recession and reduced funding availability that the COVID-19 crisis has led MTC to be very conservative in the development of their recommendations for their fiscally constrained RTP. MTC staff provided recommendations to MTC's Planning Committee on June 12, 2020. MTC staff recommended that the Valley Link project be included in their RTP, that the ACE Rail Service Increase Program be "considered" for inclusion, and that the Altamont Corridor Vision Phase 1 be excluded from further consideration. MTC staff have not yet identified which programs either recommended for inclusion or considered for inclusion would be part of the "before 2035" (fiscally constrained) RTP. Some of the "recommended" and "considered" programs will be relegated to being long-term projects that would implemented after 2035. Some of the programs listed as "considered" will recommended to be excluded from the MTC RTP.

Through communications with Alameda County Transportation Commission (ACTC), it was recommended to SJRRC that to get the ACE Rail Service Increase Program included in MTC's fiscally constrained RTP, SJRRC should develop and submit to MTC a phased approach for the ACE Rail Service Increase Program.

The ACE Rail Service Increase Program is focused on the improvements, equipment and operational funding needed to run 10 daily round trips between the Central Valley and San Jose. The ACE Rail Service Increase Program can and should be implemented in phases. The biggest capital cost improvement for this program is the improvement through the Alviso wetlands, this is also the most complicated improvement through a very environmentally sensitive area which will take considerable time to get environmental clearance and permits. While this improvement is needed to get substantial increases in frequency for ACE (and the Capitol Corridor) to San Jose, and is key for long-term resilience in the corridor, it has by far the longest lead time of the ACE Rail Service Increase Program.

The first phase of the ACE Rail Service Increase Program should be getting the 5<sup>th</sup> and 6<sup>th</sup> ACE daily round trips (DRT) operating between the Central Valley and San Jose. Getting two additional ACE round trips is something that is estimated to be relatively low-cost (approximately \$139 million), very low impact, and achievable in the near-term. Prior to the COVID-19 crisis the need for additional ACE service already existed. These two round trips could be phased in over several years (estimated at 2024 for the 5<sup>th</sup> daily round trip and 2026 for the 6<sup>th</sup> daily round trip).

The next phase of the ACE Rail Service Increase Program would be adding additional ACE daily round trips between the Central Valley and Fremont/Union City/Newark (staff do not think SJRRC will be able to run more than six round trips to San Jose without implementing the major improvement through the Alviso wetlands). Four additional round

trips would be added over time starting in 2028 and anticipated to be complete in 2034. This would bring the total ACE service to 10 daily round trips (6 between the Central Valley and San Jose and 4 between the Central Valley and Fremont/Union City/Newark). The incremental capital cost for this increase is estimated at approximately \$93 million.

The last phase of the program (beyond 2035) would be extending more ACE trains to San Jose. To accomplish this, the improvements through the Alviso wetlands would need to be completed, as well as other improvement in Santa Clara, and Alameda Counties (expansion of the layover facility in Santa Clara County, track improvements in Santa Clara, and additional station and parking improvements at Fremont, Livermore, and Pleasanton).

This proposed phasing of the ACE Rail Service Increase Program could dramatically reduce the costs of the program in the near/mid-term. The high-cost Alviso wetlands improvements (and other improvements associated with 10 round trips to San Jose) do not occur until after 2035. Under this assumption, both capital and operating costs would be reduced substantially in the time before 2035, while ACE would still be running 10 daily round trips prior to 2035. The increase in ACE frequency would enable ACE to continue to serve the growing needs of the Northern California Megaregion and would fit well with ACE's expansion program to Sacramento and Merced (which has received over \$1 billion in state funding) and provide significantly improved connectivity to the CHSRA's Merced – Bakersfield High Speed Rail Interim Operating Segment.

It is estimated that the ACE Rail Service Increase Program capital costs needed prior to 2035 would be reduced from \$831 million down to \$231 million (in FY 19 \$) with the proposed phased approach. The Bay Area share of the operating costs for the 10 daily round trips would be reduced from \$15.2 million down to \$11.2 million a year. However, since the round trips would be phased in over time the operating cost savings would be much greater. The estimated operating cost for the Bay Area for adding two ACE daily round trips (5<sup>th</sup> and 6<sup>th</sup> DRTs) to San Jose is \$4.4 million annually.

Staff recommends SJRRC take action to approve the April 10 Commitment Letter to MTC, and to support both the phased approach for the ACE Rail Service Increase Program as well as Valley Link to be included in the fiscally constrained MTC RTP (before 2035).

#### Fiscal Impact:

A key commitment in the April 10 letter to MTC was for SJRRC to move forward with an ACE Means Base Fare Program. At the May 1, 2020 SJRRC Board Meeting, the SJRRC approved the ACE Means Based Fare Program and the application for LCTOP funding. SJRRC applied to Caltrans on April 17, 2020 for \$534,417 of LCTOP funds for the ACE Means Based Fare Program. SJRRC expects to receive notice of the award of LCTOP funds from Caltrans by the end of June. The COVID-19 crisis will delay the implementation of the ACE Means Based Fare Program.

Recommendation:

Approve a Resolution of the Board of Commissioners of the San Joaquin Regional Rail Commission (SJRRRC) Approving the April 10, 2020 Commitment Letter Submitted by the Tri-Valley – San Joaquin Valley Regional Rail Authority (Authority) and SJRRRC to the Metropolitan Transportation Commission (MTC), Adopting a Phased Approach for the ACE Rail Service Increase Program, and Supporting the ACE Rail Service Increase and Valley Link Programs to be Included in the Fiscally Constrained (Before 2035) MTC Regional Transportation Plan (RTP).

April 10, 2020

Therese McMillian  
Metropolitan Transportation Commission  
375 Beale Street  
San Francisco, CA 94105-2066

**RE: Tri-Valley – San Joaquin Valley Regional Rail Authority and San Joaquin Regional Rail Commission  
Commitment Letter**

Dear Therese,

The Tri-Valley – San Joaquin Valley Regional Rail Authority (Authority) and San Joaquin Regional Rail Commission (SJRRRC) appreciate the Metropolitan Transportation Commission (MTC) working with our agencies to include the “Altamont Corridor Vision Phase 1”, “Valley Link” and “ACE Rail Service Increase” programs in your Horizon/Plan Bay Area 2050 process. Our understanding is that your analysis found no deficiencies with the Valley Link Project, and that it is well positioned for inclusion in the fiscally constrained Regional Transportation Plan (RTP). The results from your analysis found deficiencies with both the Altamont Corridor Vision Phase 1 and the ACE Rail Service Increase programs (“Challenges” with “Equity Scores” for both of these, and deficient benefit-cost ratios for the Altamont Corridor Vision Phase 1).

The Authority and SJRRRC greatly appreciate this opportunity to boost the performance of the Altamont Corridor Vision Phase 1 and the ACE Rail Service Increase programs. The strategies, commitments, and information in this letter focus on improving how MTC views the Altamont Corridor Vision Phase 1 and ACE Rail Service Increase programs (summarized on Attachment 1).

The Authority and SJRRRC request for all three of these programs (Altamont Corridor Vision Phase 1, Valley Link, and ACE Rail Service Increase) be included in MTC’s fiscally constrained RTP. The Altamont Corridor Vision Phase 1, Valley Link, and ACE Rail Service Increase programs are Megaregional programs that will compete well for state, federal, regional funds (from programs like the proposed FASTER Bay Area measure), as well as local funding from Bay Area counties and from counties in the San Joaquin Valley. The Altamont Corridor Vision Phase 1, Valley Link and ACE Rail Service Increase programs are consistent with MTC’s 2007 Regional Rail Plan, MTC Resolution 3829 from 2007, the 2018 State Rail Plan and support and provide integrated connectivity to the Merced – Bakersfield HSR Interim Operating Segment. The Authority and SJRRRC understand that phased implementation of these programs may be needed depending on the amount of funding available through various potential sources and will work with MTC and other regional partners to determine phased approach should full funding not be obtained in the short-term.

### **Benefit – Cost Ratio for “Altamont Corridor Vision Phase 1”**

The Horizon/Plan Bay Area 2050 Final Project Performance Findings has the Altamont Corridor Vision Phase 1 with benefit – cost ratios of less than one for all three categories. There are several policy commitments the Authority and SJRRC are making in this letter to address this performance deficiency of the Altamont Corridor Vision Phase 1. Additional information is also provided for MTC to take into consideration for increasing benefits that were not necessarily captured in MTC’s benefit – cost analysis of the Altamont Corridor Vision Phase 1.

#### **Commit to Cost-Review with MTC**

The Authority and SJRRC commit to a detailed cost-review with MTC. This detailed review would include the assumptions made for MTC’s lifecycle costs as well as the capital and operational costs made for the Altamont Corridor Vision Phase 1. The Altamont Corridor Vision Phase 1 would continue to utilize the Executive Steering Committee (that includes CalSTA, Caltrans, MTC, SJCOG, ACTC, BART and SJRRC) that has been set up for the Valley Link program to help ensure efficient project delivery, to find ways to reduce costs, and to avoid cost escalation.

#### **Commitments to Promote Transit-Oriented Development and Affordable Housing**

The Authority and SJRRC strongly support the development of transit-oriented development (TOD) and affordable housing around rail stations as a local-level mitigation. The Altamont Corridor Vision Phase 1 will be catalyst to help promote TOD throughout the Altamont Corridor in the Bay Area and the Northern San Joaquin Valley. The Authority’s and SJRRC’s existing and proposed rail services have supported or are supporting the development of over 1,800 new affordable housing units identified already to date in Bay Area TODs. SJRRC and Authority will continue to work with the municipalities and developers on increasing affordable housing at the stations.

Altamont Corridor Vision Phase 1 creates new TOD opportunities at many of the stations served by Valley Link and/or ACE. These include, Livermore (Isabel and Southfront), Tracy (Downtown), River Islands, Manteca (Downtown), Ripon (Downtown), Modesto (Downtown), Ceres (Downtown), Turlock, Livingston/Atwater (Downtown), Merced (Downtown), Old North Sacramento, Mid-Town Sacramento, and Natomas (North Sacramento). Altamont Corridor Vision Phase 1 increases TOD potential at other existing Bay Area and San Joaquin Valley ACE stations, including Livermore (Vasco), Livermore (Downtown), Pleasanton (Downtown), Fremont, Great America, Santa Clara, San Jose (Diridon), and Stockton (Downtown). A fact sheet on TOD for the Altamont Corridor Vision Phase 1 (for the section between Stockton and San Jose) is included as Attachment 2 to this letter.

The Authority and SJRRC commit to support complementary land-use policies that promote TOD and a greater amount of affordable housing near and around rail stations served by Valley Link and/or ACE services. This commitment includes working with members of the Legislature to get legislation passed

and signed by the Governor that would provide incentives for TOD and affordable housing near passenger rail stations.

The Northern San Joaquin Valley has been providing affordable housing for Bay Area workers who are priced out of the very expensive Bay Area housing market for many years. The number Bay Area workers commuting to the San Joaquin Valley has been rapidly growing over the last decade – and is forecast to continue to rapidly grow through 2050 and beyond. Much of the housing built in the San Joaquin Valley over the last two decades can be characterized as sprawl. There are very limited public transportation options between the Northern San Joaquin Valley and the Bay Area. While ACE trains are full during the weekdays, there are only four daily round trips which greatly limit ACE ridership<sup>1</sup>. In addition, the existing alignment over the Altamont Pass greatly restricts train speeds and hurts the ability for passenger rail to compete with the automobile. As a result of limited transit options that provide competitive travel times, a very high percentage of the Bay Area workers commuting from the Northern San Joaquin Valley are making their drives as single-occupancy vehicle commuters.

The Altamont Corridor Vision Phase 1 is a transformational project that can help change development patterns in the Northern San Joaquin Valley. There cannot be TOD without high-quality transit service. The 125 mph train speed through the Altamont corridor with the Altamont Corridor Vision Phase 1 (and accompanying 15-minute travel time savings that the new alignment brings for Valley Link and ACE) is significant, with Valley Link annual ridership estimated to increase 70%. The Altamont Corridor Vision Phase 1 will be much more likely to get residents out of their vehicles and help change land-use patterns. High-quality transit to the Northern San Joaquin Valley can also help to attract jobs to the Northern San Joaquin Valley. This key benefit would help improve the jobs-housing imbalance and also eliminate some of the need for commuting between the Northern San Joaquin Valley and the Bay Area. Bay Area companies can more easily have satellite offices in the Northern San Joaquin Valley where

last year. As a result, SJRRC can now commit to running four additional daily round trips between the Northern San Joaquin Valley/Sacramento and Fremont/Newark/Union City. This would bring the total ACE round trips to 10 daily round trips (6 between the Northern San Joaquin Valley/Sacramento and San Jose, and 4 between the Northern San Joaquin Valley/Sacramento and Fremont/Newark/Union City). The four additional ACE round trips (a 67% increase in frequency from the originally proposed 6 daily round trips) would result in a substantial increase in projected ACE ridership<sup>2</sup>. This would result in substantial additional VMT reductions and improved connectivity to the Northern San Joaquin Valley, Sacramento and to the Merced – Bakersfield HSR Interim Operating Segment. These additional round trips could provide a direct connection to BART and Union City and/or a direct connection to the Capitol Corridor and the future Dumbarton Rail Service at a multi-modal hub station in Newark as well provide additional connectivity to the existing Fremont station and the Tri-Valley stations served by ACE.

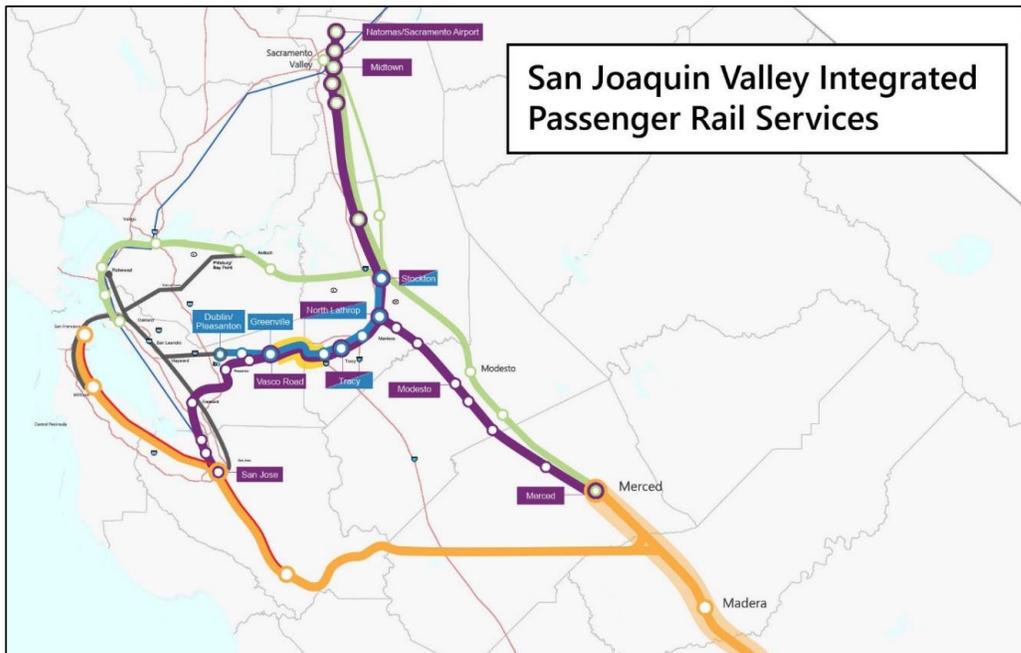
*Plan Bay Area 2050 Methodology Doesn't Fully Quantify Altamont Corridor Vision Phase 1 Benefits*

The Altamont Corridor Vision Phase 1 is a transformational Megaregion project. The Authority and SJRRC believe MTC's Horizon/Plan Bay Area 2050 methodology cannot fully quantify the benefits of the Altamont Corridor Vision Phase 1. In addition to the transformative TOD land use changes that the Altamont Corridor Vision Phase 1 would encourage, it is difficult to quantify the substantial benefit of improved connectivity from the Bay Area to the Merced-Bakersfield HSR Interim Operating Segment (see Figure 1). It also appears that the importance of ridership has been discounted (as compared to accessibility within the Bay Area) and therefore VMT reduction, GHG reductions, and air quality improvements from the Altamont Corridor Vision Phase 1 program do not necessarily get as much credit as they should.

The Authority and SJRRC have developed a strong partnership to plan, secure funding, and implement the Altamont Corridor Vision Phase 1. This joint effort has generated enthusiastic support throughout

federal, state, local, county, and potentially private-sector financing will fund the Altamont Corridor Vision Phase 1 to the greatest-extent possible. The capital costs needed for the Altamont Corridor Vision Phase 1 are not expected to be fully funded from MTC/ABAG's regional discretionary fund sources.

Figure 1 Integrated Passenger Rail Services



**Equity Scoring for “Altamont Corridor Vision Phase 1” and “ACE Rail Service Increase” Programs**

Both of Altamont Corridor Vision Phase 1 and the ACE Rail Service Increase programs were found by MTC to have “Challenges” with their Equity Scores. Based on discussions with MTC staff, it is our understanding that these challenges are primarily a result of the relatively high percentage of ACE passengers that are above the Bay Area median household income level. There are several policy commitments SJRRC is making in this commitment letter to address this performance deficiency of the ACE service that has been identified by MTC. In addition, this letter presents additional information for MTC to take into consideration that could boost how the ACE service is scored for equity.

**Means-Based Fares Commitments**

As a new regional mitigation strategy, SJRRC commits to working with MTC on expanding means-based fares programs for ACE and other public transportation services. SJRRC has a means-based fare program in place for the ACE service. For this program, SJRRC offers 50% discounts on ACE tickets to seniors, disabled passengers, youth (children under 12 years old) and to college students at Santa Clara University, San Jose State University, and Los Positas College. As an initial part of its commitment, SJRRC proposes to expand its means-based fare program to include subsidizing some very low and extremely low-income riders (\$50,000 or less household income for a family of 4) that are not eligible in SJRRC’s current program.

SJRRC proposes to utilize up to \$550,000 annually in LCTOP funding over the next three fiscal years to subsidize this expansion of SJRRC’s means-based fare program. SJRRC will request \$534,417 in LCTOP funding for the means-based program for FY20-21. SJRRC will work with MTC and other partners to ensure stable, continued funding for the program. Although Valley Link was not found to have equity challenges, the Authority also commits to working with MTC to develop means-based fare programs for

income and low-income riders about the low-cost multi-ride ACE fares and the benefits of riding ACE as compared to driving.

*Fare Integration Commitments*

A key part of the success of the ACE service is the extensive network of free shuttles at the Great America Station and the two free shuttle routes which serve the Pleasanton Station that take ACE passengers to/from their places of employment. These shuttles are also critical for the added service proposed under the Altamont Corridor Vision Phase 1 and ACE Rail Service Increase projects. SJRRC also has an agreement with VTA to provide free transfers to the VTA light rail transit and bus services for ACE passengers. SJRRC expects that these transfers will continue with the increase in service proposed. SJRRC, working with SJRTD, Mountain House and SJCOG, started and contributed funding for a pilot program to run shuttles from Mountain House to the ACE Vasco station with SJRTD and is investigating other similar partnership opportunities with SJRTD and other transit providers. SJRRC understands the importance of free or discounted transfers and is committed to working with MTC and ACTC on additional free or discounted transfers to other local bus systems in the MTC region.

SJRRC is currently working with the State on its' initiative on integrated fares— California Integrated Travel Project (Cal-ITP). SJRRC is committed to being part of a pilot program for Cal-ITP (with the three state-supported intercity passenger rail services) and will continue to encourage other commuter rail agencies to join in on the initiative and pilot program. The Cal-ITP is expected to help with making verification for very low-income eligibility easier and cheaper.

*Transit-Oriented Development and Affordable Housing*

The Authority and SJRRC commit to strongly support TOD and affordable housing around Valley Link, ACE and joint Valley Link/ACE stations. Please see the TOD commitments from the Authority and SJRRC

any commuter-oriented service to the Bay Area. The Authority and SJRRC believe it is not reasonable to treat commuter rail services the same as other transit service when considering the average household incomes of those riding the service.

It is important to consider that the household incomes for ACE passengers should be significantly higher for those living in the Bay Area (commuting in from Pleasanton, Livermore and Fremont) than those commuting in from Tracy, Lathrop, Manteca and Stockton. It is the lowest wage earners from the Bay Area that are forced to move to the Central Valley and commute back to their jobs. The high-end workers can afford to live in the Bay Area. Prior to the COVID-19 crisis about 59% of ACE morning boardings were in San Joaquin County, now with the Bay Area and Northern San Joaquin Valley under shelter-in-place orders (and ridership down over 92%), over 90% of the ACE morning boardings are from San Joaquin County (where there are more lower-income riders with fewer options).

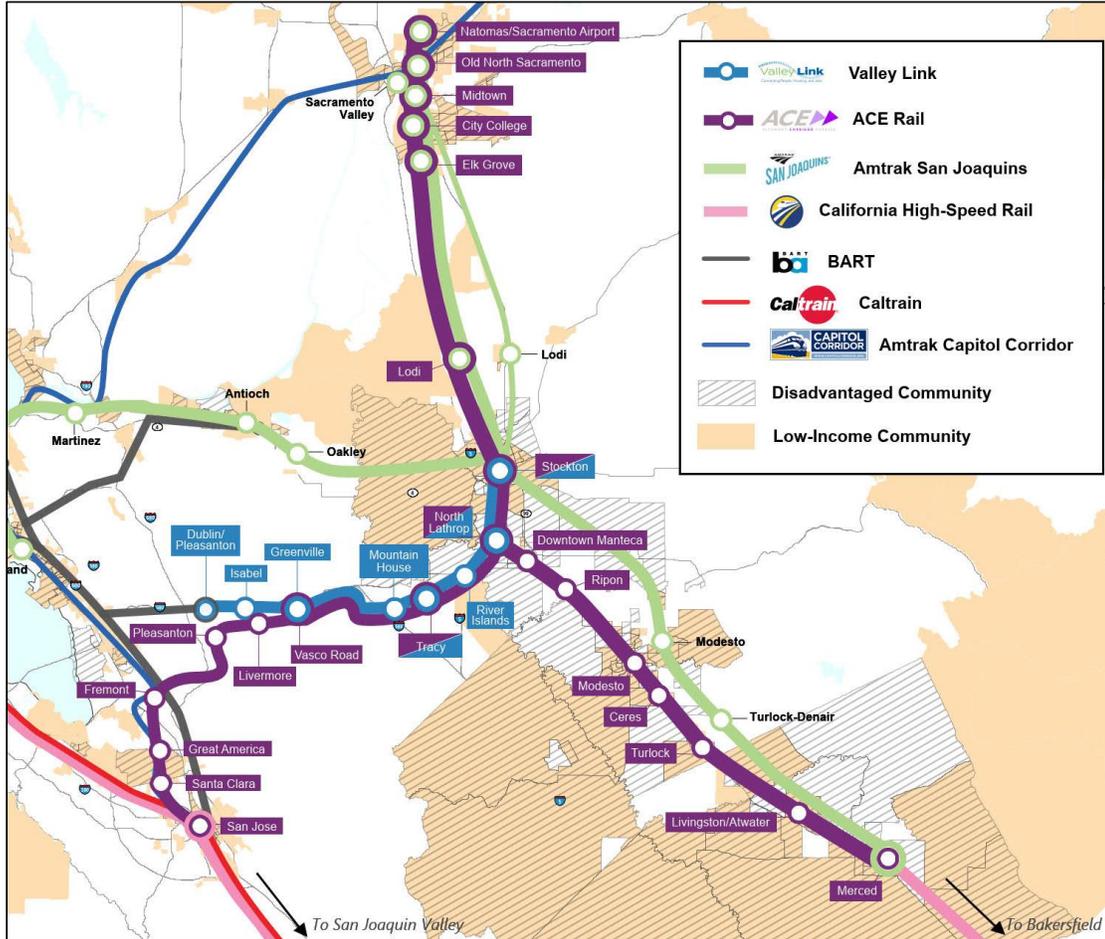
As ACE extends to Merced and to Sacramento and serves additional markets further out in the San Joaquin Valley, SJRRC expects that the median household income of the average ACE rider will decrease and the opportunities to encourage lower income riders will increase. The large capital improvement of the new alignment through the Altamont Pass for the Altamont Corridor Vision Phase 1 (costing \$1.1 billion in FY 19 \$) will result in more lower-income and middle-class riders from the Northern San Joaquin Valley taking ACE or Valley Link rather than driving in single occupancy vehicles.

#### *Serving Disadvantaged and Low-Income Populations*

The Altamont Corridor Vision Phase 1 and the ACE Rail Service Increase programs serve some of the most disadvantaged parts of California and serve over 30 percent of the Priority Populations in California (low-income and disadvantaged communities as defined by the California Air Resources Board).

While the Bay Area alone has a population of over 600,000 low income and disadvantaged communities located within 5-miles of ACE and Altamont Corridor Vision Phase 1 stations, most of the Northern San Joaquin Valley has been classified as “disadvantaged and/or low-income” (see Figure 2) by the state. Low-income residents in disadvantaged communities benefit from having increased access to jobs, education, health facilities and other services with improved and expanded passenger rail services. They also benefit from the improved service even if they don’t utilize the service themselves. Low-income residents receive air quality benefits, more opportunities for transit-oriented development/affordable housing, and an improved economy and quality of life in their community. Improved rail service in the Bay Area and Northern San Joaquin Valley will also help promote jobs in the communities that it serves which can enable low-income residents’ opportunities to live closer to their place of work.

Figure 2 Disadvantaged and Low-Income Communities



*Air Quality Benefits and Reduction in Greenhouse Gases*

The Valley Link Board of Directors is committed to the reduction of GHG emissions, pursuing renewable energy sources, zero emission vehicles, and striving to attain 100 percent self-sufficiency by applying global best practices. With the Altamont Corridor Vision Phase 1, Valley Link and ACE ridership increase significantly (Valley Link ridership increases 70%), which helps reduce vehicle miles traveled (VMT) and greenhouse gases (GHGs) improving air quality. Combined, the complimentary Valley Link and ACE service ridership when using the Altamont Corridor Vision Phase 1 would result in a total reduction of 300 VMT annually and the reduction of over 134,000 metric tons of GHG emissions in the first decade. SJRRC is committed to further increasing the benefits of ACE service by taking measures to reduce the emissions from ACE trains. ACE is transitioning to a fleet of Tier four locomotives. Four Siemens Charger locomotives have already been delivered and will be deployed this year. These locomotives are capable of carrying up to ten cars (the current locomotives can only carry up to seven and meet travel times) while reducing emissions by 80 – 90%. SJRRC has also committed to use renewable diesel fuel which will further improve air quality and will greatly reduce GHG emissions associated with ACE operations.

In partnership with the San Joaquin Joint Powers Authority (SJJPA) and the Authority, this January, SJRRC applied for a \$30 million Transit and Intercity Rail Capital Program (TIRCP) grant to initiate a pilot program to develop and implement a zero-emission locomotive for ACE service and to study zero-emission multiple unit trainsets for use by Valley Link, ACE and the San Joaquins. Enhancing air quality through the many disadvantaged communities which Valley Link and ACE will serve is a significant benefit of the Altamont Corridor Vision Phase 1 and the ACE Rail Service Expansion programs.

**Conclusion**

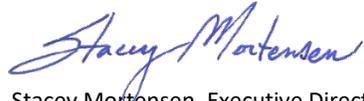
The Authority and SJRRC believe that strategies, commitments, and additional information provided in this letter should improve how MTC views the Altamont Corridor Vision Phase 1 and ACE Rail Service Increase programs. The Authority and SJRRC request that all three of the programs they submitted (the Altamont Corridor Vision Phase 1, Valley Link, and ACE Rail Service Increase) be included in MTC's fiscally constrained RTP.

The Altamont Corridor Vision Phase 1, Valley Link, and ACE Rail Service Increase programs are Megaregional programs that are critical for the future of the Bay Area and the Bay Area Megaregion. These programs will compete well for state, federal (including stimulus funding), regional funds (from programs like FASTER Bay Area), as well as local funding from Bay Area counties and from counties in the San Joaquin Valley. The Altamont Corridor Vision Phase 1, Valley Link and ACE Rail Service Increase programs are consistent with MTC's 2007 Regional Rail Plan, MTC Resolution 3829 from 2007, the 2018 State Rail Plan and support and provide integrated connectivity to the Merced – Bakersfield HSR Interim Operating Segment. The Authority and SJRRC appreciate your consideration and look forward to working with MTC to advance these important programs.

Please contact Michael Tree with the Authority and Dan Leavitt ([dan@acerail.com](mailto:dan@acerail.com)) with SJRRC if you have any questions.

Sincerely,

Michael Tree, Executive Director  
Tri-Valley – San Joaquin Valley Regional Rail  
Authority  
[mtree@lavta.org](mailto:mtree@lavta.org)



Stacey Mortensen, Executive Director  
San Joaquin Regional Rail Commission  
[Stacey@acerail.com](mailto:Stacey@acerail.com)

CC:

Chad Edison, California State Transportation Agency

Adam Noelting, Metropolitan Transportation Commission

Alix Bockelman, Metropolitan Transportation Commission

# ATTACHMENT 1

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## Benefit Cost Assessment and Equity Commitments

# Attachment 1: Benefit Cost Assessment and Equity Commitments

## Altamont Corridor Vision Phase 1 and ACE Rail Service Increase Programs

The Authority and SJRRC greatly appreciate this opportunity to boost the performance of the Altamont Corridor Vision Phase 1 and the ACE Rail Service Increase programs. The commitments in the below tables focus on improving how MTC views the Altamont Corridor Vision Phase 1 and ACE Rail Service Increase programs.

### Altamont Corridor Vision Phase 1

BENEFIT – COST RATIO COMMITMENTS	
Cost	Detailed cost-review with MTC
	Utilize the existing Valley Link Executive Steering Committee to help ensure efficient project delivery, to find ways to reduce costs, and to avoid cost escalation
Benefits	Support complementary land-use policies that promote TOD and a greater amount of affordable housing near and around rail stations served by ACE and/or Valley Link services
	Work with members of the Legislature on passing incentives for TOD and affordable housing near passenger rail stations
	Increase frequency (an additional four daily round trips) of the ACE service between the Northern San Joaquin Valley and Fremont/Newark/Union City for this program
	Work with MTC on quantifying the benefits for transformational rail projects

### Altamont Corridor Vision Phase 1 and ACE Rail Service Increase

EQUITY COMMITMENTS		
Means-Based Fares	SJRRRC	Expand means-based fare program to include subsidizing very low and extremely low-income riders (\$50,000 or less household income for a family of 4) that are not eligible in current program
		Coordinate with MTC, ACTC, and VTA to work with Bay Area employers around ACE stations to request that they subsidize fares
	The Authority	Work with MTC to develop means-based fare programs for Valley Link to help improve the equity scoring for the Altamont Corridor Vision Phase 1
Fare Integration	SJRRRC	Work on extending the free and/or discounted transfers for the shuttles at the Great America and Pleasanton shuttles and the VTA LRT and bus systems

		Work with MTC and ACTC on additional free or discounted transfers to other local bus systems in the MTC region
		Be part of a pilot program for the California Integrated Travel Project (Cal-ITP)
Air Quality Benefits and Reduction in Greenhouse Gases	SJRRRC	Further increase the benefits of ACE service by taking measures to reduce the emissions from ACE trains
		Use renewable diesel fuel which will further improve air quality and will greatly reduce GHG emissions associated with ACE operations

### Altamont Corridor Vision Phase 1 and ACE Rail Service Increase

Benefit Strategies and Information	
Commuter Rail Rider Income Levels	Household incomes for ACE passengers should be significantly higher for those living in the Bay Area (commuting in from Pleasanton, Livermore and Fremont) than those commuting in from Tracy, Lathrop, Manteca and Stockton
	The capital improvement of the new alignment through the Altamont Pass for the Altamont Corridor Vision Phase 1 will result in more lower-income and middle-class riders from the Northern San Joaquin Valley taking ACE or Valley Link rather than driving
Serving Disadvantaged and Low-Income Communities	Projects would serve over 30 percent of the Priority Populations in California (low-income and disadvantaged communities as defined by the California Air Resources Board)
	The Bay Area has a population of over 600,000 low income and disadvantaged communities located within 5-miles of ACE and Altamont Corridor Vision Phase 1 stations
	Low-income residents in disadvantaged communities benefit from having increased access to jobs, education, health facilities with improved and expanded passenger rail services. They also benefit from the improved service even if they don't utilize the service receiving air quality benefits, more opportunities for TODs/affordable housing, and an improved economy and quality of life in their community

# ATTACHMENT 2

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## Transit-Oriented Development Fact Sheet

# Altamont Corridor Vision Phase 1: Valley Link, Improved ACE, Shared Altamont Pass

### Altamont Corridor Vision Provides Opportunities to Concentrate Growth

Between 2011 and 2015, the Bay Area generated one unit of housing for every eight jobs created. Due in part to this severe imbalance of jobs to housing, the median home price in the Bay Area is approximately three times that of the San Joaquin Valley, leading thousands of Californians to settle in the San Joaquin Valley while maintaining employment in the Bay Area. This growth is still continuing today. The population of San Joaquin County is anticipated to increase by 18% from 2015 to 2030.

As the San Joaquin Valley continues to grow, the Altamont Corridor Vision will provide an opportunity to focus growth in the San Joaquin Valley around transit. Increased service frequencies, speeds, and reliability will create convenient and safe transportation options for Californians traveling throughout the California megaregion.



**Figure 1. Jobs-Housing Imbalance in the Bay Area**  
Source: Bay Area Council Economic Institute

### Transit-Oriented Development (TOD) Around Altamont Corridor Vision Stations



**Figure 2. Rendering of Ageno Apartments TOD near ACE Vasco Station**  
Source: liveatageno.com, 2019



**Figure 3. Rendering of Downtown Tracy Valley Link Station Area**  
Source: AECOM

Transit-oriented development around rail stations has been found to increase transit ridership, increase farebox revenues, reduce VMT, spur neighborhood revitalization and economic development, and improve quality of life for residents by providing direct, walkable access to transit and livable neighborhoods.

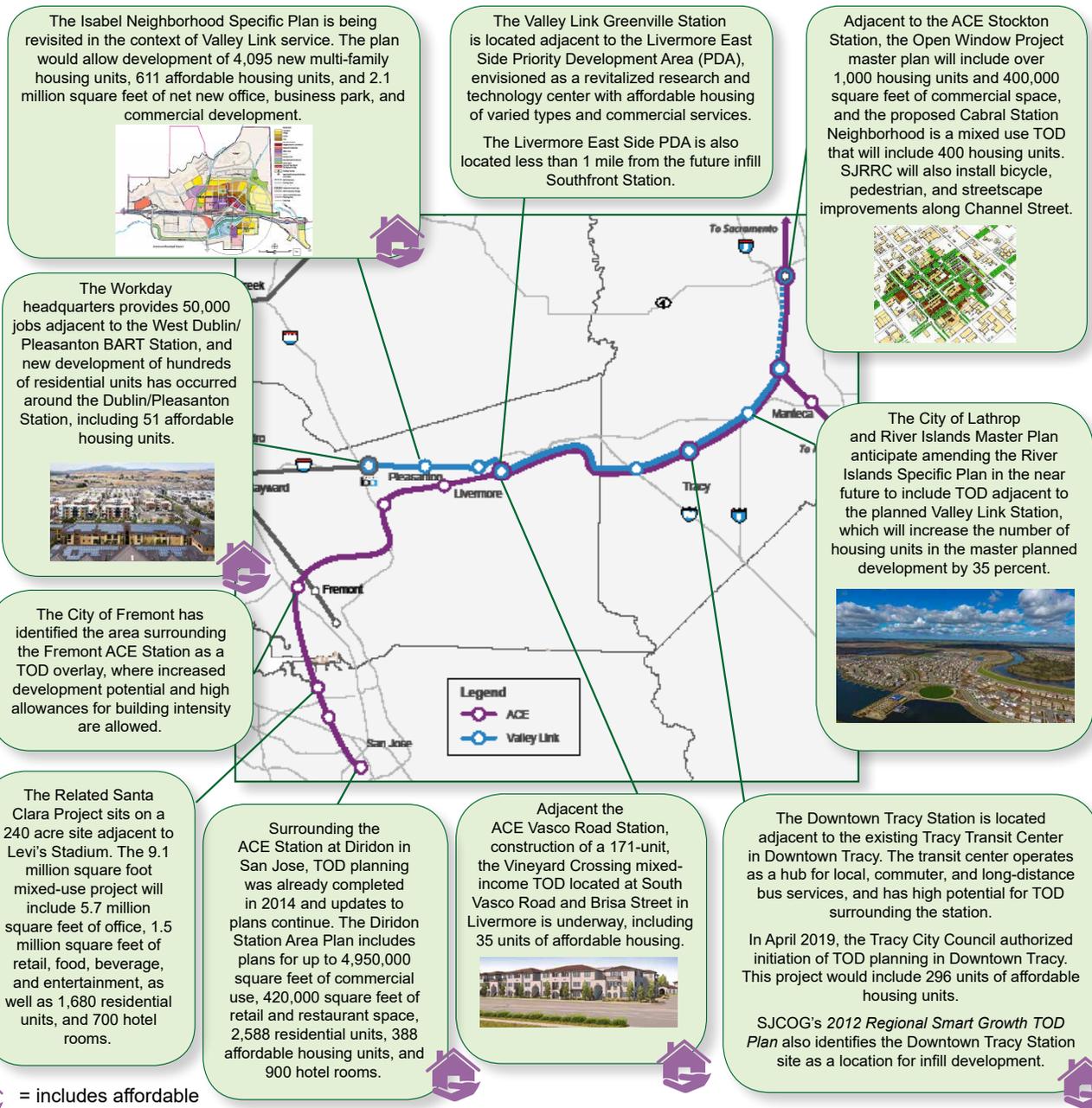
The SJRRC and the Authority have already begun working with local jurisdictions to provide TOD-supportive stations and the Altamont Corridor Vision will allow for increased leverage and higher potential for TOD at many stations along the Valley Link and ACE rail alignments. By paving the way for universal corridor, a one-seat ride, and faster service times, the Altamont Corridor Vision lays the groundwork for a future where sustainable, transit-oriented communities make transit a convenient and accessible option for local and regional travel.

# Altamont Corridor Vision Phase 1: Valley Link, Improved ACE, Shared Altamont Pass

## TOD Opportunities by Station

Figure 4 below describes the TOD potential of stations included in the Altamont Corridor Vision Phase 1. These stations are located in areas with planned or potential mixed land use and density. Planning will occur in partnership with the local jurisdictions leading these planning efforts. Station design and access will focus on developing walkable and transit-friendly station environs that will support TOD.

**Figure 4. TOD Opportunities along the Altamont Corridor Vision Phase 1 Alignment**



**RESOLUTION SJRRC-R-20/21-**

**RESOLUTION OF THE BOARD OF COMMISSIONERS OF THE SAN JOAQUIN REGIONAL RAIL COMMISSION (SJRRC) APPROVING THE APRIL 10, 2020 COMMITMENT LETTER SUBMITTED BY THE TRI-VALLEY – SAN JOAQUIN VALLEY REGIONAL RAIL AUTHORITY (AUTHORITY) AND SJRRC TO THE METROPOLITAN TRANSPORTATION COMMISSION (MTC), ADOPTING A PHASED APPROACH FOR THE ACE RAIL SERVICE INCREASE PROGRAM, AND SUPPORTING THE ACE RAIL SERVICE INCREASE AND VALLEY LINK PROGRAMS TO BE INCLUDED IN THE FISCALLY CONSTRAINED (BEFORE 2035) MTC REGIONAL TRANSPORTATION PLAN (RTP)**

WHEREAS, MTC required the SJRRC and the Authority to submit a “Commitment Letter” to MTC by April 10, 2020 in order to boost the performance of the Altamont Corridor Vision Phase 1 and ACE Rail Service Increase Program so these programs could be further considered for inclusion in MTC’s RTP; and

WHEREAS, on April 10, the Authority submitted a joint Commitment Letter with SJRRC; and

WHEREAS, MTC is further requiring that agency Boards must take action to approve their Commitment Letters by August 2020; and

WHEREAS, the COVID-19 crisis and recession have reduced funding availability and limited the number of projects MTC can include in their fiscally constrained RTP; and

WHEREAS, a phased approach is needed to get the ACE Rail Service Increase Program included in MTC’s fiscally constrained RTP; and

WHEREAS, SJRRC proposes a phased approach for the ACE Rail Service Increase Program that would have two additional ACE round trips between the Central Valley and San Jose and four additional round trips between the Central Valley and Fremont/Newark/Union City by 2035 that would greatly reduce the capital and operational costs needed before 2035; and

WHEREAS, SJRRC supports the complementary Valley Link project be included in the fiscally constrained MTC RTP (before 2035);

NOW, THEREFORE, BE IT RESOLVED, that the Board of Commissioners of the San Joaquin Regional Rail Commission hereby approve this Resolution approving the April 10, 2020 Commitment Letter Submitted by the Tri-Valley – San Joaquin Valley Regional Rail Authority (Authority) and SJRRC to the Metropolitan Transportation Commission (MTC), Adopting a Phased Approach for the ACE Rail Service Increase Program, and Supporting the ACE Rail Service Increase and Valley Link Programs to be Included in the Fiscally Constrained (Before 2035) MTC Regional Transportation Plan (RTP).

PASSED AND ADOPTED, by the Board of Commissioners this 2<sup>nd</sup> day of July 2020, by the following vote:

AYES:  
NOES:  
ABSTAIN:  
ABSENT:

ATTEST:

SAN JOAQUIN REGIONAL  
RAIL COMMISSION

\_\_\_\_\_  
STACEY MORTENSEN, Secretary

\_\_\_\_\_  
CHRISTINA FUGAZI, Chair

SPDS ITEM #3  
SEPTEMBER 2, 2020

SAN MATEO COUNTY TRANSIT DISTRICT  
STAFF REPORT

TO: Strategic Planning, Development, and Sustainability Committee

THROUGH: Jim Hartnett  
General Manager/ CEO

FROM: Carter Mau  
Deputy General Manager

SUBJECT: DUMBARTON RAIL CORRIDOR PROJECT – PROJECT STATUS UPDATE AND  
BOARD APPROVAL OF PROJECT COMMITMENT LETTER TO MTC

ACTION

Staff proposes that the Committee recommend Board approval of a Dumbarton Rail Corridor Project Commitment Letter to the Metropolitan Transportation Commission (MTC) for the project's inclusion in the MTC Plan Bay Area 2050 (PBA 2050), which is the region's long-range transportation plan.

SIGNIFICANCE

MTC's PBA 2050 is a long-range plan charting the course for the future of the nine-county San Francisco Bay Area in four key areas: the economy, the environment, housing and transportation. This long-range plan is developed and approved by the MTC every four years, and PBA 2050 is scheduled for approval by the MTC and the Association of Bay Area Governments (ABAG) in summer 2021. For most major transportation projects to proceed from conception to implementation, one of the key requirements is their inclusion in and/or consistency with the region's long-range transportation plan.

In fall 2019 and winter 2020, MTC completed an evaluation of all major projects that were submitted to PBA 2050, including the Dumbarton Rail Corridor Project (Project) and released the performance results. In spring 2020, following the project performance assessment, MTC provided project sponsors with an opportunity to revise their projects for consideration in the "Draft Blueprint" for PBA 2050. MTC also requested that project sponsors provide commitment letters documenting the revised projects as well as strategies to address any performance concerns from the project performance assessment.

Building on the analysis and results from the Draft Blueprint, MTC has recently released a proposed "Final Blueprint" that includes the projects that are proposed for inclusion in PBA 2050. Dumbarton Rail Corridor is currently included in the Final Blueprint. MTC has requested that project sponsors share the commitment letters that were submitted to MTC in spring 2020 with their governing boards, and that these governing boards approve the project commitment letters.

To that end, attachment A to this staff report presents the material that was previously submitted to MTC for the Project. The commitments primarily focused on reducing Project costs and increasing Project benefits. On the cost side, the Project team had focused on the appropriate technology that should be studied for the corridor, including possible use of light rail (LRT) or autonomous group rapid transit (GRT) on an alternative East Bay right of way. On the benefit side, the Project team committed to look at opportunities for housing and development around the project's stations and the land use connection to transit. With a possible shift to a different technology, there could be opportunities for additional stations that could lead to additional ridership and more sites for transit-oriented developments.

#### BUDGET IMPACT

Board of Directors (Board) approval of the Project commitment letter has no budget impact.

#### BACKGROUND

In August of 2018, the San Mateo County Transit District (District) entered into an Exclusive Negotiating Agreement (ENA) with Cross Bay Transit Partners (CBTP) to determine the feasibility of development within the Dumbarton Rail Corridor. When approving the ENA, the Board also authorized the General Manager/CEO to extend the ENA for up to three consecutive periods of six months each. The original term of the ENA expired in February 2020, and was extended to August 2020, and recently it was extended a second time to February 2021.

Since the execution of the ENA, CBTP on-boarded a team of technical consultants and subject matter experts to develop environmental clearance documentation, engineering plans, financial assessment, and other technical studies to advance the Project to the implementation phase.

At the January 2020 Board meeting, staff reported that the District and CBTP were developing a funding and implementation strategy and had begun coordination with various partners. Due primarily to the COVID-19 pandemic, one of the private partners of CBTP, Facebook, Inc., has recently expressed it will focus its attention on efforts that can yield impacts in the short term. This new focus includes continuing local investments in economic opportunity, essential community services, and near-term traffic relief in the local neighborhoods of Menlo Park. As a result, Facebook's involvement in the Project will be limited, moving forward. At this time, Facebook proposes to fund and lead the compilation of the work to-date into a report that presents a recommendation for a "Locally Preferred Alternative" or "LPA." CBTP is also discussing how to restructure its partnership with Facebook. Staff will provide a status update on these evolving developments at the September Board meeting.

Prepared by: April Chan  
Chief Officer, Planning, Grants & TA

650-508-6228

**Attachment A**



April 10, 2020

Ms. Alix Bockelman  
Deputy Executive Director  
Metropolitan Transportation Commission  
Association of Bay Area Governments

**RE: Horizon/Plan Bay Area 2050: Transportation Element, Next Steps for Project Performance Findings,  
Dumbarton Rail Corridor Project**

Dear Ms. Bockelman,

The San Mateo County Transit District appreciates the opportunity to provide the Metropolitan Transportation Commission (MTC) with feedback on the Final Project Performance Findings and next steps for the Transportation Element of Plan Bay Area 2050.

We have been working with your staff on the “collaborative space” approach to the Dumbarton Rail Corridor Project to develop policy commitments and/or Project refinements that address the Project’s performance deficiencies in benefit-cost ratio and equity metrics. We are also collaborating with City/County Association of Governments (CCAG) of San Mateo County, the San Mateo County Transportation Authority (SMCTA), Santa Clara Valley Transportation Authority (VTA) and Alameda County Transportation Commission (ACTC) for the Project’s local funding commitments to demonstrate support consistent with the history of the Project in the region and taking into account the current opportunity for private sector funding and financing to advance the Project through delivery.

Our work thus far in collaborating with partner rail and transit agencies has resulted in letters of support for the Project, as part of a regionally connected network. You will find evidence of these partnerships in attached letters of support for funding. The project commitments outlined below and, in the attachments, address opportunities for housing around stations, efforts to reduce construction costs, efforts to reduce the physical and environmental footprint, the draft funding plan, and innovations in delivery as requested through our coordination with your staff. We have made significant improvements in these areas and expect to continue to refine and improve the Project in conjunction with MTC and other regional stakeholders.

Future capital funding from the private sector will be contingent upon successful completion of design, environmental clearance, and permitting/entitlements that are required to deliver the Project, all funded by Cross Bay Transit Partners, LLC (CBTP). Even in the most extreme scenarios that assume full private funding, it’s not possible for a private entity to deliver this Project on its own. The inextricable nature of

**SAN MATEO COUNTY TRANSIT DISTRICT**  
1250 San Carlos Ave. - P.O. Box 3006  
San Carlos, CA 94070-1306 (650) 508-6200

regulatory and ministerial approvals and multiple jurisdictions that the Project traverses, solidifies its union with the public sector at the federal, state, regional and local levels. MTCs role in approvals, including the determination of inclusion in PBA 2050's constrained funding plan and many future funding and regional prioritizations, is paramount to ensuring substantial private sector contributions. For the Dumbarton Rail Corridor Project; a regional need that has been studied and evaluated for nearly 30 years; MTCs agreement to include the Project in the constrained long-range transportation plan is critical to our efforts to secure a substantial amount of funding from the private sector and delivery of the Project. In addition, without inclusion, we are not able to advance federal environmental clearance which would result in lost opportunities for funding and approvals.

Ultimately, the Dumbarton Rail Corridor is a regional asset that requires action. The District has a coherent plan that complies with all regulatory requirements, has established key partnerships at the federal, state, regional and local level to ensure success, and has executed an agreement with a consortium that includes both a major regional employer and a leading private infrastructure developer to advance the Project. We are doing our part to ensure this public asset is no longer a regional liability and instead delivers much needed transportation capacity for our communities.

Thank you for the opportunity to participate in the Horizon/Plan Bay Area 2050 planning process. We will continue to work with MTC on the development of project refinements and policy commitments to increase the benefits, equity and reduce costs of the Project such that it is considered in the Bay Area's constrained funding plan.

Sincerely,



Carter Mau  
Deputy General Manager/CEO, San Mateo County Transit District

Cc: Winsome Bowen, Facebook  
Eliot Jamison, Plenary Americas



## Dumbarton Rail Corridor Project

The following pages provide the Dumbarton Rail Corridor Project commitments that have been developed to address performance deficiencies in benefit-cost ratio and equity metrics. The Project is supported within the region and within Peninsula and East Bay communities as demonstrated by the letters of support and focus on partnerships to develop mutually beneficial Project investments.

In efforts to reduce project costs and increase project benefits, the San Mateo County Transit District (District) and Cross Bay Transit Partners, LLC (CBTP) continue to investigate potential improvements in project performance through the use of either light rail (LRT) or autonomous group rapid transit (GRT) on an alternative East Bay right of way to avoid the need to seek approval from Union Pacific Railroad (UPRR) for use of their right of way beyond the Dumbarton Rail Corridor.

The District and CBTP continue to support opportunities for housing and development around the Project's stations and the land use connection to transit. Through ongoing investigation and project development activity, additional station locations are proposed beyond those that were included in the original project description submitted to MTC (also reflecting the proposed LRT/ GRT alternative alignment in the East Bay). These additional stations will increase project ridership and transportation benefits as well as opening up more opportunities for housing as part of transit-oriented development. Given the new opportunity to submit letters of interest for Priority Development Areas (PDAs) or expand existing PDAs, the District and CBTP is evaluating PDAs throughout the Dumbarton Rail Corridor Project area and continuing discussions with its city partners.

In addition, efforts to reduce the physical and environmental footprint, the draft funding plan, and innovations in delivery are outlined below.

## Support and Collaboration

### Regional support

In early 2019, the project outreach team began early touch testing with local, regional, and state elected officials to gauge awareness and support of the Dumbarton Rail Corridor Project. Together we have invested in early engagement and education with West Bay and East Bay political stakeholders along the corridor. These individuals will continue to receive our priority attention as we move forward. We have been focused on updating political opinion leaders, stakeholders and the community, which we will continue to do as part of the Environmental Impact Report (EIR)/ Environmental Impact Statement (EIS) process and requirements. The EIR/ EIS process includes formal meetings, community meetings, and multiple interaction with the various agencies. At the beginning of 2020, we began to accelerate and expand political engagement efforts as the Dumbarton Project continues to achieve further definition. This public engagement with political stakeholders has built interest and provided a support for cities and counties to work collaboratively, create ownership, and demonstrate support.

## Dumbarton Rail Corridor Project

As a result of the regional outreach described above, letter of support have been provided for the project from the following political and business leaders; a copy of the support letters are included as an attachment:

- Senator Jerry Hill
- Congresswoman Jackie Speier
- Congresswoman Anna Eshoo
- Assemblymember Kevin Mullin
- Assemblymember Marc Berman
- East Bay Economic Development Alliance
- Silicon Valley Leadership Group

In early 2020, letters of support for the project's Transit and Intercity Rail Capital Program (TIRCP) application were provided by additional regional partners including operators of regional transportation networks that would connect with the proposed Dumbarton Rail Corridor service. Letters of support for the TIRCP application were received from the following; copies of all support letters are included as attachments:

- City of Newark
- City of Redwood City
- Peninsula Corridor Joint Powers Board (PCJPB)
- San Joaquin Regional Rail Commission
- Tri-Valley-San Joaquin Valley Regional Rail Authority
- Assemblymember Marc Berman
- Senator Jerry Hill
- Senator Jim Beal
- Senator Bob Wieckowski
- Assemblymember Kevin Mullin

#### Tri-cities coordination and response

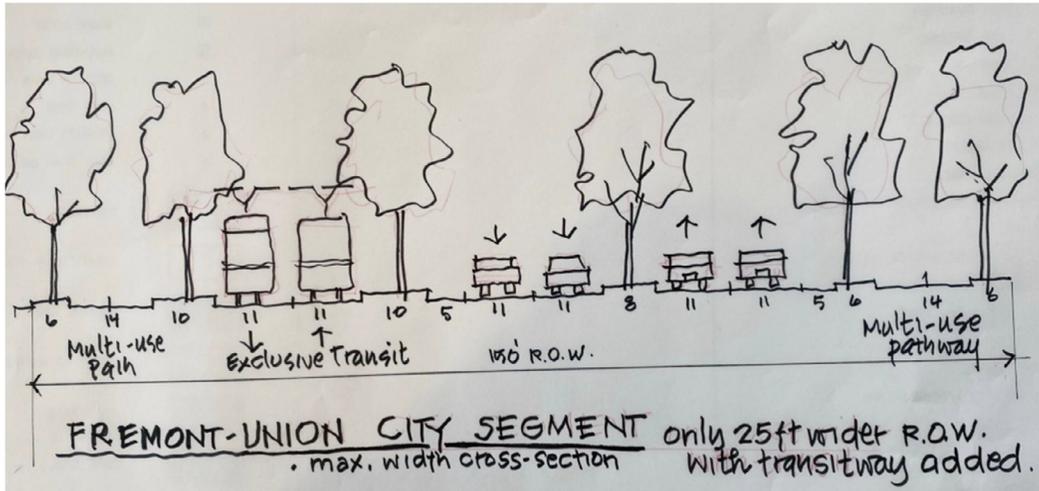
In addition to other regional outreach efforts, the project team has worked extensively and collaboratively with the East Bay cities in the project alignment: Newark, Fremont, and Union City. We have met both individually and as a collective with the Tri-Cities' public works, economic development and planning staffs to give a project overview, gain an understanding of their existing and proposed projects in the vicinity of the proposed alignment, and have detailed work sessions to integrate our proposed alignment(s) into their rights-of-way.

With the City of Newark, we have collaboratively worked on plans and sections of the proposed LRT/ GRT alignment to be integrated into their proposed complete street project along Thornton Avenue.

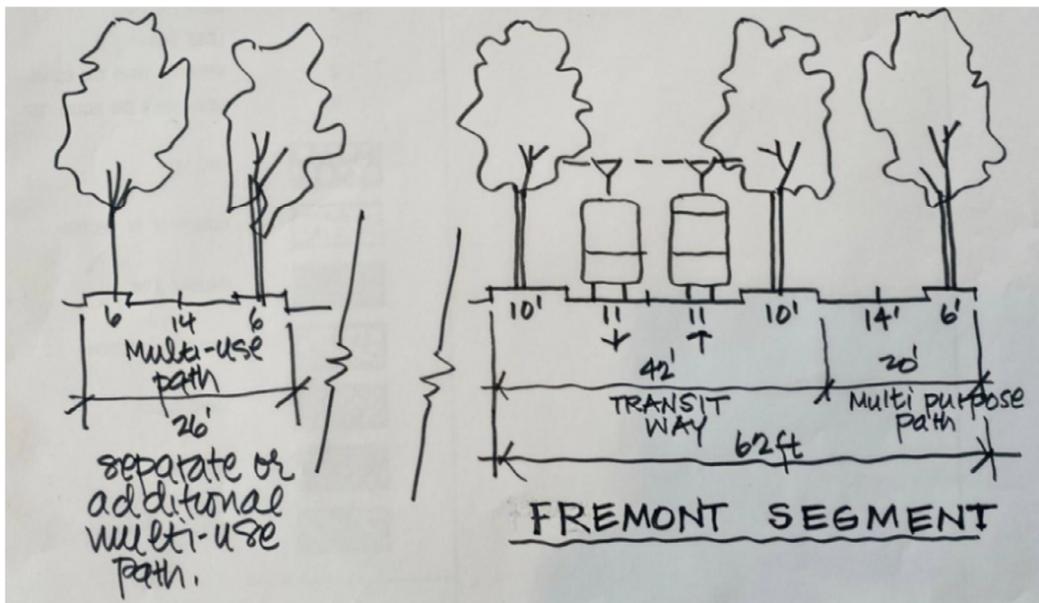
With the cities of Fremont and Union City, we have collaborated on the integration of transit within the Quarry Lakes Parkway corridor. Our engineering and urban design teams have worked with city staff on concepts that integrate transit into this corridor while addressing concerns regarding previous environmental approval, various ownership, development, financing, and community outreach strategy. Conceptual cross-sections based on this collaboration are provided below.

With Union City, we have had separate work sessions addressing the integration of the Dumbarton alignment and station in conjunction with the existing BART station.

Dumbarton Rail Corridor Project



Conceptual Cross-Section: Transit with Roadway at Quarry Lakes Parkway



Conceptual Cross-Section: Transit with Multi-use path at Quarry Lakes Parkway

## Dumbarton Rail Corridor Project

## Opportunities for Housing Around Stations

Station locations remain under review and will be finalized in consultation with stakeholders and in consideration of the following factors:

- Environmental impact
- Existing and proposed traffic
- Existing and proposed land use
- Urban design
- Accessibility
- Engineering feasibility
- Availability of land for station area
- Community need
- Ridership
- PDA-designation or eligibility
- Etc.

The proposed station locations are generally aligned with Priority Development Areas (PDAs). Those that are not in existing PDAs are located in PDA-eligible areas. We would propose to expand the current PDAs and nominate new PDAs to a quarter-mile radius encompassing development around each proposed station location. See table below for reference.

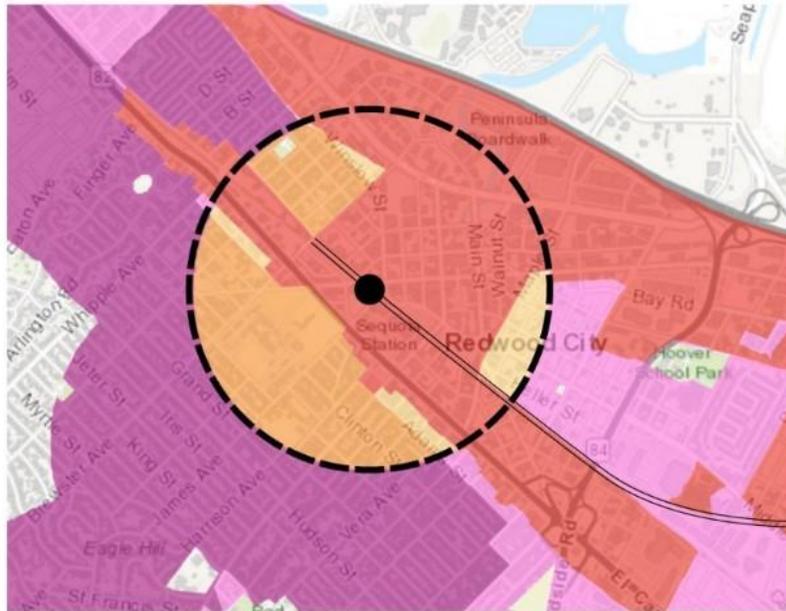
Proposed Station	City	County	PDA-Designated	PDA-Eligible	Expand Current PDA	Nominate New PDA
Redwood City Sequoia Station	Redwood City	San Mateo County	Y		Y	
Middlefield Road Station	NA	San Mateo County	Y		Y	
Willow Road Station	Menlo Park	San Mateo County		Y		Y
Newark Station	Newark	Alameda County	Y		Y	
Ardenwood Station	Fremont	Alameda County		Y		Y
Fremont Boulevard Station	Fremont	Alameda County	Y		Y	
Quarry Lakes Parkway Station	Union City	Alameda County	Y		Y	
Union City Station	Union City	Alameda County	Y		Y	

The following pages detail the station locations and their relationship to existing PDAs and PDA-eligible areas.

Dumbarton Rail Corridor Project

Redwood City Sequoia Station

The proposed Redwood City Sequoia Station is located in a designated PDA.



Proposed Redwood City Sequoia Station

Legend

-  Priority Development Areas (March 2020)
- Undesignated PDA-eligible Areas (March 2020)**
-  Connected Community Outside High Resource Area
-  Connected Community Within High Resource Area
-  Transit-Rich Outside High Resource Area
-  Transit-Rich Within High Resource Area
-  1/4-Mile Radius, Proposed Priority Development Area
-  Proposed Station Location
-  Proposed Alignment

Dumbarton Rail Corridor Project

Middlefield Road Station

Dependent on the final location after study taking into consideration engineering, urban design, traffic, environmental and ridership concerns, the proposed Middlefield Road Station in North Fair Oaks, an unincorporated community within San Mateo County, is located in a designated PDA or in an Undesignated PDA-eligible Area, coded as a Connected Community Outside High Resource Area. We would propose to have San Mateo County nominate to expand the existing PDA into the PDA-eligible area to encompass the proposed station as well as a quarter-mile radius, similar to other existing stations shown on the PDA map.



Proposed Middlefield Road Station

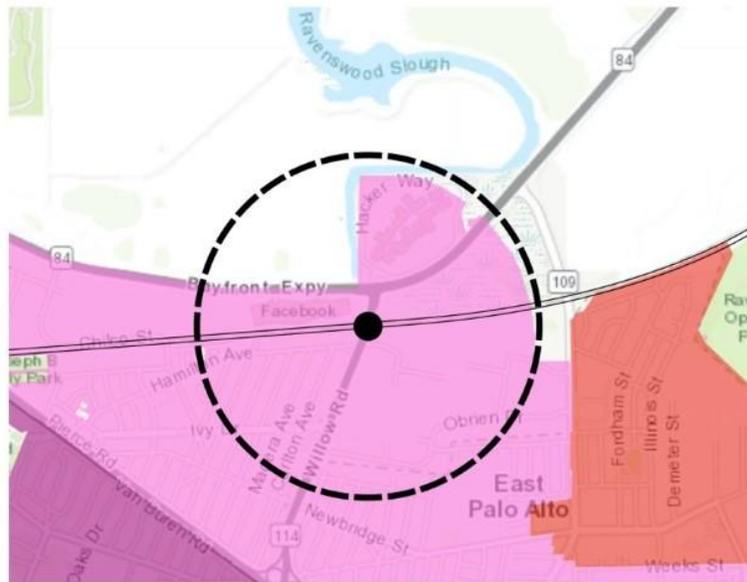
Legend

- Priority Development Areas (March 2020)
- Undesignated PDA-eligible Areas (March 2020)
  - Connected Community Outside High Resource Area
  - Connected Community Within High Resource Area
  - Transit-Rich Outside High Resource Area
  - Transit-Rich Within High Resource Area
- 1/4-Mile Radius, Proposed Priority Development Area
- Proposed Station Location
- Proposed Alignment

Dumbarton Rail Corridor Project

Willow Road Station

The proposed Willow Road Station in Menlo Park is located in an Undesignated PDA-eligible Area, coded as a Connected Community Outside High Resource Area. We would propose to have Menlo Park or San Mateo County nominate the designation of a PDA in the eligible area of a quarter-mile radius encompassing the proposed station.



Proposed Willow Road Station

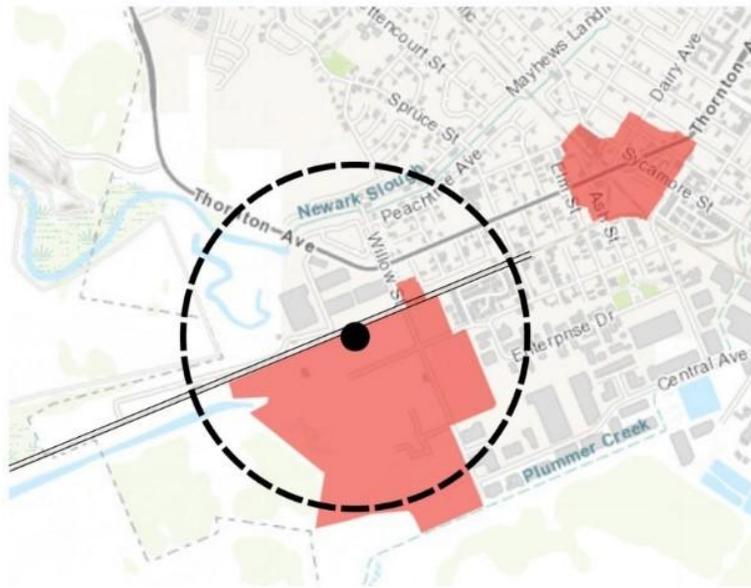
Legend

- Priority Development Areas (March 2020)
- Undesignated PDA-eligible Areas (March 2020)**
- Connected Community Outside High Resource Area
- Connected Community Within High Resource Area
- Transit-Rich Outside High Resource Area
- Transit-Rich Within High Resource Area
- 1/4-Mile Radius, Proposed Priority Development Area
- Proposed Station Location
- Proposed Alignment

Dumbarton Rail Corridor Project

Newark Station

Newark had previously nominated and designated the area outlined in their 2010 Dumbarton TOD Specific Plan as a Priority Development Area. We would propose to have Newark expand the borders of that PDA to encompass the commercial development area to the north of the tracks.



Proposed Newark Station

Legend

-  Priority Development Areas (March 2020)
- Undesignated PDA-eligible Areas (March 2020)**
  -  Connected Community Outside High Resource Area
  -  Connected Community Within High Resource Area
  -  Transit-Rich Outside High Resource Area
  -  Transit-Rich Within High Resource Area
-  1/4-Mile Radius, Proposed Priority Development Area
-  Proposed Station Location
-  Proposed Alignment

Dumbarton Rail Corridor Project

Ardenwood Station

The proposed Ardenwood Station is located in Undesignated PDA-eligible Areas: Connected Community Outside High Resource Area and Connected Community Within High Resource Area. We would propose to have the cities of Fremont and Newark, or Alameda County nominate the designation of a PDA in the quarter-mile radius encompassing the proposed station.



Proposed Ardenwood Station

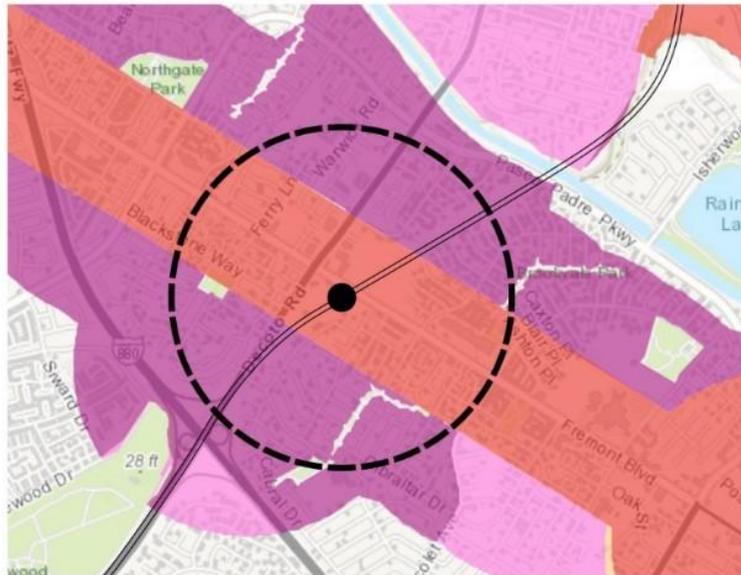
Legend

- ▮ Priority Development Areas (March 2020)
- Undesignated PDA-eligible Areas (March 2020)**
  - ▮ Connected Community Outside High Resource Area
  - ▮ Connected Community Within High Resource Area
  - ▮ Transit-Rich Outside High Resource Area
  - ▮ Transit-Rich Within High Resource Area
- 1/4-Mile Radius, Proposed Priority Development Area
- Proposed Station Location
- Proposed Alignment

Dumbarton Rail Corridor Project

Fremont Boulevard Station

The proposed Fremont Boulevard Station is located in a PDA-designated area. We would propose to have the city of Fremont or Alameda County expand the border of that PDA into the PDA-eligible Area of Connected Community Within High Resource Area for a quarter-mile radius encompassing the proposed station.



**Proposed Fremont Boulevard Station**

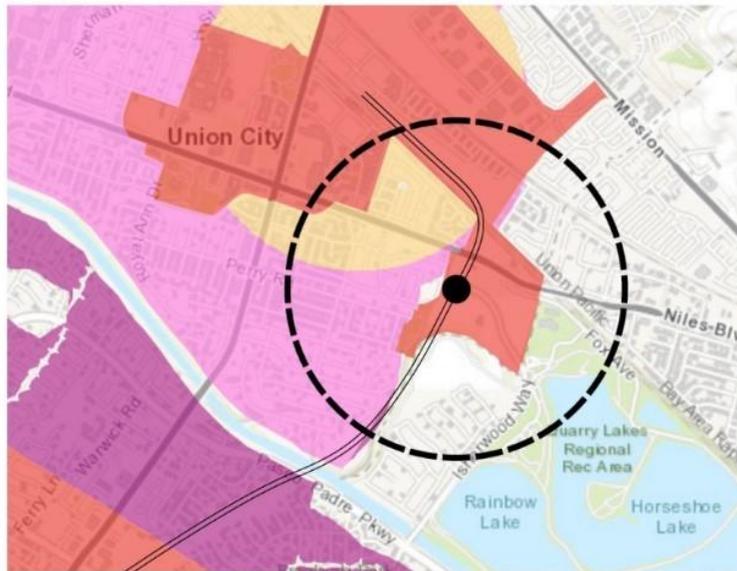
Legend

- Priority Development Areas (March 2020)
- Undesignated PDA-eligible Areas (March 2020)**
- Connected Community Outside High Resource Area
- Connected Community Within High Resource Area
- Transit-Rich Outside High Resource Area
- Transit-Rich Within High Resource Area
- 1/4-Mile Radius, Proposed Priority Development Area
- Proposed Station Location
- Proposed Alignment

Dumbarton Rail Corridor Project

Quarry Lakes Parkway Station

The proposed Quarry Lakes Parkway Station is located in PDA-designated area. Potential: We would propose to have the cities of Fremont and Union City, or Alameda County, expand the border of that PDA into the PDA-eligible Areas of Connected Community Outside High Resource Area and Transit-Rich Outside High Resource Area for a quarter-mile radius encompassing the proposed station.



Proposed Quarry Lakes Parkway Station

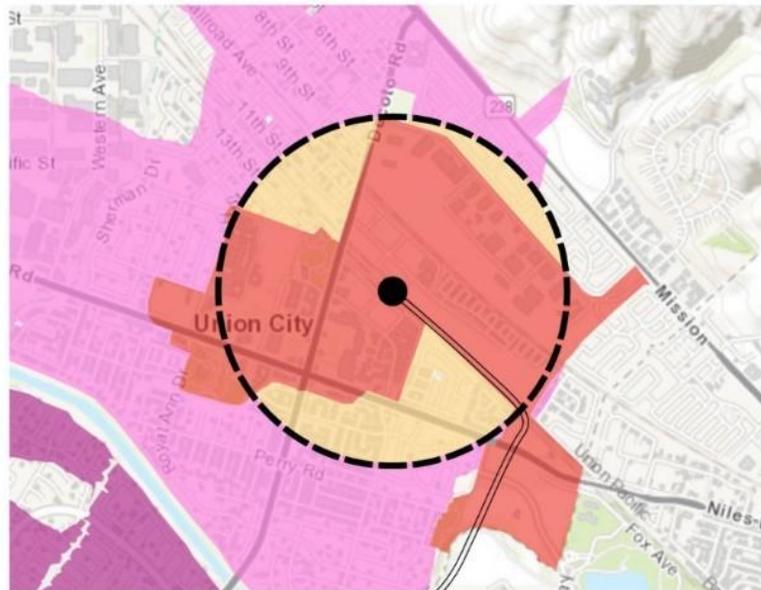
Legend

- Priority Development Areas (March 2020)
- Undesignated PDA-eligible Areas (March 2020)**
- Connected Community Outside High Resource Area
- Connected Community Within High Resource Area
- Transit-Rich Outside High Resource Area
- Transit-Rich Within High Resource Area
- 1/4-Mile Radius, Proposed Priority Development Area
- Proposed Station Location
- Proposed Alignment

Dumbarton Rail Corridor Project

Union City (BART) Station

The proposed Union City Station is located in PDA-designated area. We would propose to have Union City, or Alameda County, expand the border of that PDA into the PDA-eligible Area of Transit-Rich Outside High Resource Area for a quarter-mile radius encompassing the proposed station.



Proposed Union City Station

Legend

-  Priority Development Areas (March 2020)
-  Undesignated PDA-eligible Areas (March 2020)
-  Connected Community Outside High Resource Area
-  Connected Community Within High Resource Area
-  Transit-Rich Outside High Resource Area
-  Transit-Rich Within High Resource Area
-  1/4-Mile Radius, Proposed Priority Development Area
-  Proposed Station Location
-  Proposed Alignment

## Dumbarton Rail Corridor Project

In addition to the creation and/or expansion of Priority Development areas along the corridor, there are multiple opportunities for housing within a quarter mile of proposed station areas. The table below provides examples of under-utilized or vacant publicly-owned land that could potentially be used for housing. Some of these parcels are zoned for housing, and some are not. We have proposed housing densities based on municipality, underlying zoning, potential zoning, and urban context. The examples below and other similar opportunities could result in increased housing potential throughout the corridor.

Parcel #	Qty	Publicly-owned	Existing Land Use	Zoning	Proposed Land Use	Land Area (ac)	Proposed Housing Density (DU/ ac)	Proposed # Housing Units (DU)
MU Ste	Fremont	Y		Mixed Use				
School District Ste	Fremont	Y	Vacant	Mixed Use / Residential				
501-1800-1-50	Fremont	Y	Vacant	Planned Residential	Residential (R-3-50)	20	35.1-50	702-1000
87-11-17-6	Union Qty	Y	Vacant	Open Space / Residential (RS6000)	Residential (RM-1500)	6	30-60	180-360
87-11-17-7	Union Qty	Y	Vacant	Open Space / Residential (RS6000)	Residential (RM-1500)	10	30-60	300-600
87-11-15-15	Union Qty	Y	Vacant	Open Space / Residential (RS6000)	Residential (RM-1500)	5.5	30-60	165-330
87-11-15-14	Union Qty	Y	Vacant	Residential (RS6000)	Residential (RM-1500)	7	30-60	210-420
87-335-6	Union Qty	Y	Vacant	Research and Development Campus District (RDC)	Station Mixed Use-Commercial (CSMU)	14	45-165	63-210

Note: All areas are approximate.

## Dumbarton Rail Corridor Project

## Efforts to Reduce Project Construction Costs, Physical and Environmental Footprint

### Construction Cost and Physical Footprint Reduction

The original project to MTC for consideration assumed Rail Technology (CRT) would be our base case assumption, and we would investigate other technologies to determine the best option to meet the Purpose and Need for this project. As we have progressed in our evaluations, it appears Light Rail Transit (LRT) or Group Rapid Transit (GRT) are better suited for our project based on the following:

- Initial lower Capital Cost
- No trackage rights agreement with UPRR needed
  - Eliminates risk of providing a reliable 10 – 20 minute headway service based on negotiating appropriate time slots on joint use track
  - Eliminates risk of ability to utilize modern EMU-type technology on UPRR-owned facilities
  - Eliminates schedule risk of negotiating all needed agreements without impacting overall project schedule
- Long term lower Operations and Maintenance (O&M) costs

The engineering team developed several measures to reduce construction costs through the design development process. Some major project elements for the Bay Crossing structure, chosen based on improvements to construction and/or O&M costs, are summarized below:

- Replacing existing movable bridge structures with fixed span LRT Bridges - \$60M savings
- Eliminating freight train use by designing for lighter vehicle equipment, therefore needing smaller/lighter structures – over \$100M savings
- Use of direct fixation tracks in lieu of ballasted tracks - \$60M savings
- Reducing bridge width to utilize single track based on operational requirements - \$35M savings

Additionally, many other elements of the project have been optimized to meet the project requirements with initial identified project savings of \$150M (primarily on Redwood City to Newark section). As we perform operations modeling on the East Bay sections, we expect to identify additional opportunities to optimize the system resulting in additional cost savings. A discussion of current project and approach to optimizations follows.

## Dumbarton Rail Corridor Project

## Preliminary Project Element Savings

Item	Project Element	Unit	Vehicle Technology		
			CRT	LRT	GRT
1	Project Limits of Double Track or Lane	miles	19.1	17.0	17.0
	Project Costs	\$, Millions	\$ 2,986	\$ 2,952	\$ 2,508
	Project Savings (excl. UPRR Trackage Rights Savings)	\$, Millions	N/A	\$ (34)	\$ (479)
2	Single Track Optimization		30%/70%	35%/65%	N/A
	Project Costs	\$, Millions	\$ 2,840	\$ 2,696	\$ 2,508
	Project Savings (Redwood City to Newark)	\$, Millions	\$ (147)	\$ (156)	N/A
	Potential Project Savings (Newark to Union City)	\$, Millions	N/A	\$ (100)	N/A
	Project Savings vs CRT (excl. UPRR Trackage Rights Savings)	\$, Millions	N/A	\$ (144)	\$ (332)
3	Stations	Number	7	7	8
	Total Station Costs	\$, Millions	\$ 321	\$ 179	\$ 217
	Project Savings vs CRT	\$, Millions	N/A	\$ (142)	\$ (104)
4	Vehicles	Number	35	60	170
	Total Vehicle Costs	\$, Millions	\$ 410	\$ 312	\$ 81
	Project Savings	\$, Millions	N/A	\$ (98)	\$ (329)
5	Bay Crossing Bridge				
	Double Track - Bay Crossing Bridge Costs	\$, Millions	\$ 434	\$ 322	\$ 169
	Project Savings	\$, Millions	N/A	\$ (112)	\$ (265)
	Single Track - Bay Crossing Bridge Costs	\$, Millions	\$ 393	\$ 291	N/A
	Project Savings	\$, Millions	\$ (41)	\$ (31)	N/A
6	Frequency of Service	minutes	20	10	On-demand
	Peak	minutes	20	10	On-demand
	Off-Peak	minutes	30	30	On-demand

### Alignment

The proposed alignment between Redwood City and Newark utilizes existing rail corridors and roadbed. In order to reduce cost, as well as minimize impacts like noise and visual aesthetics to adjacent properties, the project is designed to be at-grade where possible; however, the alignment would be elevated at certain critical grade crossings to minimize impacts to roadway vehicular traffic or where stations are located at roadway intersections. Approximately 80% of the alignment in this segment is at-grade on the existing roadbed.

The alignment from Newark to Union City makes use of public rights-of-way and is at-grade where possible to minimize costs and environmental impacts. Approximately 25% of this section is anticipated to be at-grade. The LRT alignment from Newark to Union City avoids the uncertainty of the UPRR upgrade costs within the UPRR ROW.

Dumbarton Rail Corridor Project

The relative average costs of construction for At-Grade, Elevated Guideway, and Tunnels/Out and Cover are as follows:

- At-Grade Base cost
- Elevated Guideway 10 times Base cost
- Tunnel/Out and Cover 15 times Base cost

ROW / Utility impacts are being revised in conjunction with any design concepts, but major ROW takes and/or utility impacts are being minimized with the current design.

Single Tracking

We utilized RTC and PTV VISSIM modeling software to identify sections of the project that could be single-tracked while still having a resilient system that could absorb random delays and still provide high on-time performance. The focus of this modeling was on high-cost sections and environmentally sensitive areas.

On the Redwood City to Newark section, we identified approximately 7 miles, or 65% of the system that could be single tracked as identified in Figures ES-1 and ES-3 below.

**Figure ES-1**  
Light Rail, Assuming 10 Minute Headways (Not to Scale)



**Figure ES-3**  
Commuter Rail, Assuming 20 Minute Headways (Not to Scale)



In the Don Edwards Wildlife Refuge, we were able to single-track 2.1 miles, which would save 3.5 acres of impacts to sensitive wetlands.

The modeling effort is in-progress on the East Bay segment and we anticipate identifying a similar percentage of single-track sections to achieve additional savings to the project.

Grade separation at intersections, tunnel vs at-grade assumptions

The current and future traffic demands are being studied and grade separations are only being implemented at locations where required to maintain level of service for roadway traffic or to facilitate station layouts.

## Dumbarton Rail Corridor Project

The team investigated tunneling for the Bay crossing and a cut and cover tunnel in Decoto Road; however, with a cost increase of at least 50% more than elevated guideway construction, we found the tunnel to be economically infeasible.

#### Bridge updates

A new bridge will replace the existing Dumbarton Bridge structure which has sections from 50 to over 110-year-old. The current structure poses an obstruction to the maritime community and will likely need to be removed if not repaired or replaced based on a recommendation from the US Coast Guard. The estimated cost for removal is \$75M.

In addition to the sections of alignment identified in the single tracking section above, the Bay crossing is proposed to be single-tracked, minimizing cost and physical and environmental impacts in the Bay and environmentally sensitive area of the Don Edwards Wildlife Refuge. We estimate a 25% capital cost savings by single-tracking this section instead of double-tracking.

The Bay crossing is planned to be designed as a fixed bridge, reducing long-term operational and maintenance costs of a movable bridge with sufficient height to maintain maritime traffic. The Bay crossing will utilize a direct fixation (DF) track to reduce the weight of structure, this resulted in a 10-15% cost savings. We evaluated rehabilitating the existing movable bridge rather than replacing it with a fixed bridge; however, the movable bridge will result in additional capital, operational and maintenance costs.

#### Approach to Technology/ Vehicles/ Power & supporting infrastructure

The team continues to have direct conversations and is evaluating a wide range of technologies with CR, LRT and GRT all being compatible to our project needs. The infrastructure needs to support these vehicles are at least 50-75% lighter than the traditional freight trains (Cooper E-80). The following technology types and their respective infrastructure needs are being evaluated from a cost benefit analysis perspective. With battery technology, we would be able to partially eliminate OCS infrastructure for a savings of \$5-7M per mile.

##### CR– Electric with Overhead Contact System (OCS) system, battery powered or combination

- Battery powered and dual mode equipment will eliminate / minimize need for a full OCS system, reducing construction and maintenance costs and having positive impact on the visual appeal of the system.
- Vehicles are over 50% lighter than Cooper E-80 freight trains

##### LRT - Electric with OCS system, battery powered or combination

- Battery powered and dual mode equipment will eliminate / minimize need for a full OCS system, reducing construction and maintenance costs and having positive impact on the visual appeal of the system.
- Lighter weight vehicles allow for lighter bridge structures which translates to lower costs.

##### GRT – Fully battery powered

- Lighter weight vehicles allow for more cost effective infrastructure
- On-Board control systems minimizing need for wayside signal equipment
- Concrete guideway is simpler and less expensive than rail (upfront and long-term O&M)
- Automated operation expected to reduce long-term O&M costs

## Dumbarton Rail Corridor Project

### Stations

Collaborative discussions related to critical interface stations are underway, specifically Redwood City, to ensure that plans incorporate current and future plans with Caltrain. The final number and locations of stations continue to be evaluated and are dependent on multiple factors including ridership, land use, public input, technology, regional mobility, etc. Stations will be right-sized to meet the ridership demands specific to locations and technology.

### Innovative Engineering/ Design

Innovative engineering and design strategies are being implemented throughout the design process to reduce costs, facilitate innovative project delivery, and increase project benefits. Strategies under consideration include:

- Standardizing project elements (such as but not limited to, station layouts, guideway spans, possible OCS configurations) where possible to allow for more cost efficient and schedule efficient project.
- Using standard length precast elements, where possible.
- Using concrete structures instead of steel structures to minimize operations and maintenance costs.
- Investigating Accelerated Bridge Construction methods and techniques where appropriate.
- Using temporary work trestles for both the construction of the new Bay crossing as well as the demolition and removal of the existing Bay crossing.
- Engaging stakeholders early on to incorporate their input (such as on-going coordination with the Tri-Cities, State Land Commission, the Bay Conservation and Development Commission, and the US Coast Guard).
- Integrating and optimizing the project with other upcoming local projects (such as the City of Redwood City Caltrain Grade Separation, Quarry Lakes Parkway, the San Francisquito Creek Joint Powers Authority Levees Project, and the Capitol Corridor Joint Powers Authority South Bay Connect).
- Making connections to existing bike paths where appropriate and local TOD projects.
- Investigating possible mitigation or enhancement measures for environmentally sensitive areas.

### Environmental Footprint Reduction (ESL reduction)

The environmental and engineering teams have collaborated on defining a Project footprint that avoids highly sensitive resources while providing a functional area for project construction and operation. The purpose of this exercise was to prepare a refined Environmental Study Limit (ESL) that represents the total project footprint to be utilized for all temporary and permanent project activities, including construction staging, operational right-of-way, station areas, and maintenance facilities (see figure on next page).

The team's environmental specialists prepared a series of high-level assessments to document and recommend minimized encroachment on protected resources and other constraints within and adjacent to the project corridor. The assessment focused on sensitive aquatic resources (wetlands and waters), sensitive plant communities, sensitive wildlife habitats, and potential conflicts with wildlife crossing (aquatic, terrestrial, and aerial).

## Dumbarton Rail Corridor Project



Dumbarton Rail Corridor Project Environmental Study Limits

### Loss of Natural Land

The estimation of land area impacted by a project in the Horizon/Plan Bay Area 2050: Revised Performance Assessment Methodology was based on a 100-foot buffer around linear project and resulted in over 350 acres of wetland impacts for the project. As described above, the actual anticipated area of impact, which includes all construction and operational activities associated with the project, is based on a reduced environmental footprint and only includes areas with the potential to directly impact sensitive resources

Identification of sensitive resources is a critical component in the project's methodology and approach for environmental documentation. The location and extent of potential wetlands and sensitive plant communities will be mapped through a combination of aerial imagery analysis and modeling of tidal elevations using publicly available tidal data from the south bay and Lidar data available from the National Oceanic and Atmospheric Administration's (NOAA) Digital Coast Data Access Viewer. The focus of the wetland and sensitive habitat assessment is on the segment of undeveloped habitat between Willow Road in East Palo Alto to Willow Street in Newark ("Bay crossing corridor"). Other portions of the alignment are heavily developed, and while the Project Team does not anticipate substantial wetland or other sensitive habitat issues in these areas, there is potential for jurisdictional wetlands to occur in topographic depressions parallel to the railroad prism. The applied methodology will also identify any major stream crossings and the location of stormwater conveyances that may need to be avoided by the project or addressed during the permitting stage if avoidance is not possible.

Once the sensitive resources have been identified, the temporary and permanent activities associated with the project will be applied, and the acreage of impact will be determined. Based on the initial site constraints analysis conducted by the team's biologist, it was determined that several aquatic communities were identified within the project ESL, including marshland, tidal land, riparian, freshwater seasonal wetland, etc. Acreages ranged from 0.29 of riparian to 100.94 of tidal land. Given that the project design is not yet finalized, an assessment of impact acreage has not yet been developed;

## Dumbarton Rail Corridor Project

however, it would not exceed the acreage of the identified resources within the ESL and is anticipated to be considerably less than the 350+ acres used in the Revised Performance Assessment Methodology.

Although the project team aims to produce a self-mitigating project through a reduced environmental footprint and design, compensatory mitigation is a vital component to ensure protection and adequate mitigation for the sensitive resources within the project area. To help streamline environmental review, federal consultations, and eventual permitting, the project team is conducting stakeholder outreach and agency scoping processes to help identify mitigation opportunities and develop a compensatory mitigation strategy or approach. Compensatory mitigation options to be investigated may include but are not limited to:

- Purchase of credits from an approved mitigation bank
- Contribution of funds to another party's existing or proposed restoration project in the South Bay
- Acquisition of properties for the purpose of preservation and/or restoration
- Funding and execution of a Conservation Easement over existing, previously unprotected habitats
- Development and implementation of a permittee-responsible mitigation project

#### Outreach and Engagement Program

The project team, in tandem with the District and Federal Transit Administration, is implementing a robust outreach and engagement program to identify topics of local concern. As the project engineers modify the ESL to incorporate design updates, the environmental team continuously reviews for potential impacts to key topics raised during coordination with external stakeholders. Over the last year, the project team coordinated with the regulatory agencies, local jurisdictions, and community groups listed below; those indicated with an asterisk (\*) indicate regular participation in the project's recurring Advisory Group meetings:

#### State and Federal Regulatory Agencies:

- California Regional Water Quality Control Board: San Francisco Bay Region
- California State Lands Commission
- Don Edwards San Francisco Bay National Wildlife Refuge
- National Marine Fisheries Service
- State Historic Preservation Office
- State Water Resources Control Board
- U.S Army Corps of Engineers, San Francisco District
- U.S Coast Guard, Bridge District 11
- U.S Environmental Protection Agency
- U.S Fish and Wildlife Service, Region 8

#### Local Jurisdictions and Resource Agencies:

- Alameda County Transportation Commission\*
- Alameda-Contra Costa Transit District\*
- Belle Haven Neighborhood
- California Department of Transportation, District 4
- Caltrain\*
- City of East Palo Alto\*
- City of Fremont\*

## Dumbarton Rail Corridor Project

- City of Hayward
- City of Menlo Park\*
- City of Newark\*
- City of Redwood City\*
- City of Union City\*
- Lorelai Manor Neighborhood
- Metropolitan Transportation Commission\*
- North Fair Oaks Neighborhood
- San Francisco Bay Conservation and Development Commission
- San Francisquito Creek Joint Powers Authority
- San Mateo County\*
- Santa Clara Valley Transportation Authority\*
- Suburban Park Neighborhood
- Town of Atherton

## Local and Community Organizations:

- Bike East Bay\*
- Don Edwards San Francisco Bay National Wildlife Refuge - Citizens Committee to Complete the Refuge
- East Bay Economic Development Alliance\*
- East Bay for Everyone\*
- Eco Transport\*
- Fremont Chamber of Commerce\*
- Friends of Caltrain\*
- Greenbelt Alliance\*
- Jobs and Housing Coalition\*
- Menlo Park Chamber\*
- Menlo Together\*
- Mid-Peninsula Open Space District\*
- Newark Chamber of Commerce\*
- Office of Government & Community Relations at Stanford University\*
- Peninsula Open Space Trust\*
- Redwood City Chamber\*
- San Francisco Bay Area Planning and Urban Research Association\*
- San Mateo County Economic Development Association\*
- Save the Bay\*
- Sequoia Audubon Society\*
- Serra Club\*
- Silicon Valley Bike Coalition\*
- SPARK - Sustainable Menlo Park\*
- Spectrum Community Services\*
- St. Francis Sena Youth Center\*
- Transform\*

To streamline project delivery, the District will recommend an efficient coordination approach with the regulatory and permitting agencies that have jurisdiction over resources within the Project area. Using the framework recommended in the Memorandum of Understanding Implementing One Federal

## Dumbarton Rail Corridor Project

Decision Under Executive Order 13807, the District prepared an Agency Coordination Plan outlining the process and key milestones for coordinating public and agency participation during the Project's environmental review cycle. The District seeks to build concurrence on this approach with applicable federal, state, and local agencies to establish concurrent, synchronized reviews, eliminate duplication of effort among agencies, and provide a forum for inter-agency decision-making.

### Funding Plan

The project has developed a funding plan including support from public sector programs at all levels (local, State, and Federal), combined with private sector funding and financing. The capital and operating funds that the District intends to use for the Project are shown in the tables below.

### Planning and Pre-Development Stage

CBTP is providing all funding for the planning and pre-development stages of the Project (through environmental clearance and prior to the start of construction) and has been doing so for the last 18 months. The projected total amount of this funding is at least \$30 million. This includes all activities necessary to facilitate and support environmental clearance (State and Federal), such as community engagement, preliminary design and engineering, technical environmental documentation, transportation impacts analysis and ridership studies, funding/market studies, transit operational modeling, right-of-way negotiations and reimbursement of the District's project-related costs.

Private sector support and leadership (aligned with the District) of this project development phase has allowed the project to move forward in an expedited manner and will accelerate project development by estimated 5 – 8 years. This momentum has also contributed to the rebuilding of local and regional consensus on the need for and benefits of the project. Together these create a unique window to advance this project in the near term. A summary of community consensus-building activities is noted in the [Support and Collaboration](#) section of this letter.

## Dumbarton Rail Corridor Project

## Design and Construction Stage

Regional and local funding for the Dumbarton Rail Corridor has been pursued and developed since 1991 in various measures and allocations. The table below summarizes projected contributions from both public and private sources for the design and construction of the project.

Source	Amount (\$mm)
<b>Private Funds</b>	
Future Private Funding/ Financing	TBD
<b>Local Funds</b>	
San Mateo County (C/ CAG)	
Measure A	\$30
Measure W	\$220
Alameda County (ACTC)	TBD
Santa Clara County (VTA)	TBD
Future Local Measures	\$1,500 - \$1,700
<b>Regional Funds</b>	
RM 2	\$135
RM 3	\$130
<b>State Funds</b>	
TIRCP 2020	\$50
TIRCP 2022	\$100
Congested Corridors	\$100
<b>Federal Funds</b>	
FTA New Starts (CIG)/ Expedited Delivery	\$900-\$750
BUILD	\$25
TIFIA/ RRIF Financing	TBD

## Dumbarton Rail Corridor Project

### Operations and Maintenance Period

An important aspect of public-private partnership or P3 delivery of infrastructure projects is to plan for the full project lifecycle during up-front development. CBTP is planning for both operating costs and revenue sources as part of its integrated project development efforts. The first step to ensuring that sufficient operating period revenue will be available is to develop design solutions and efficiencies which reduce O&M costs. This is reflected already in the ongoing refinements to project definition outlined in the [Construction Cost and Physical Footprint Reduction](#) section of this letter and will be an ongoing priority for CBTP and the District. O&M cost effectiveness, delivery, and operations efficiencies are some of the primary reasons for investigating technology alternatives such as light rail, and autonomous mass transit modes. Revenue sources during the O&M period are summarized in the following table:

Source	Description
Fare Revenue	Fare revenues directly from public passengers as well as from employers and employees through regional transit pass program (Clipper card, Clipper Direct).
Ancillary Revenues	Ancillary revenues such as advertising, retail, parking, communications.
Value Capture – Special Assessment	Payments from adjacent landowners such as a special assessment which attaches to the property, potentially through a Community Facilities Districts (“CFD”).
Value Capture - Tax Increment	The Project may be able to leverage the benefits provided to local landowners through special tax districts such as an Enhanced Infrastructure Financing Districts (“EIFD”).
Local sales tax measures	San Mateo County Measures A and W have allocations which are applicable to this project and would be received over time. In addition, RM2 has funding for cross-bay transit service in the Dumbarton Corridor.
FASTER Bay Area	The project will seek both construction period and operation period funds from any new regional measure

Based on the projected ridership demand, high-frequency and high-quality service, integrated first/last mile planning and an active marketing program including outreach to local employers, CBTP expects fare revenue to be able to cover a significant portion of O&M costs. This will serve as the core source of O&M period funding which will result in a more sustainable project over the long term. In addition, experience from other transit projects with private sector participation (both in the United States and elsewhere around the world) points to the potential for revenue generation from ancillary sources such as parking (at certain stations), retail, advertising, and even use of the corridor for complementary uses such as communication infrastructure.

### Value Capture

It is well established that new, high quality transit service increases property values and makes station areas more attractive for residents and businesses. However, using this value creation to help fund the transit project has proved to be a challenge for many project sponsors and has rarely been implemented. The private sector participation in development, financing and delivery of the DRC Project makes this project an ideal candidate for value capture funding. The private development team

## Dumbarton Rail Corridor Project

will bring more flexible capital and a clear understanding of the development potential at each station area, providing greater comfort in the achievability of future value capture revenue.

The specific revenue streams which are being investigated and are likely to be applicable to the DRC project are tax increment revenue (through an Enhanced Infrastructure Financing District) and/ or a special assessment (through a Community Facilities District). Revenues from both of these types of districts are realized over time and can be used for repayment of project construction costs and in certain instances for maintenance costs. CBTP has engaged Kosmont Group to evaluate the potential for value capture funding and provide advice on implementation. Initial analysis at a single station area showed significant potential, with cumulative revenue in excess of \$500 million in a mid-range scenario (over a 30-50 year project planning period).

CBTP is evaluating the potential at additional station areas and will begin more detailed conversations with the applicable jurisdictions (cities and counties) after such evaluation. Value capture revenue has the potential to be an important new revenue source for the Project and is part of the planned innovative financing approach.

### Innovation

The project is being advanced through a unique public-private partnership (P3) between the District and CBTP, pursuant to an Exclusive Negotiating Agreement (“ENA”) signed in August 2018. Infrastructure project delivery P3s typically involve a design-build-finance-operate-maintain (DBFOM) contract in which the responsibility, and risk, for successful project delivery and operation is allocated to a private sector consortium. The partnership formed for this project intends to adopt this approach but has also gone a step further by involving the private sector partner in early stage project planning and permitting activities. This innovative approach has a number of benefits for the project, including:

- Private sector resources (funding and staffing) have accelerated project development and allowed the project to advance an estimated 5-8 years sooner than it otherwise would have;
- Early involvement of the team that is expected to be responsible for project delivery results in a greater focus on technical and financial feasibility from the beginning, allowing such considerations to be fully incorporated in environmental clearance and project planning.

The innovative approach to project development and delivery will continue in the future phases of the project. For example, CBTP intends to initiate procurement of key contractors including design-builder and vehicle supplier in parallel with the completion of the environmental review. This will allow for a faster transition into project construction and, depending on the specific timing, can provide for additional technical input into early project planning. CBTP is exploring approaches such as progressive design-build which would provide for early contractor input into constructability and related issues. The final approach and timing for contractor procurement and selection will be determined in consultation with the District and project funding partners (as appropriate). The tables on the following pages describe each project delivery method under consideration by the project team and summarizes the generally accepted benefits and challenges associated with each.

Finally, CBTP’s approach to project delivery will encompass planning for long-term operations and maintenance during the planning and design phases. This will ensure that a “whole of life” approach to the project is adopted and that early decisions properly reflect rider experience, long term maintainability and energy efficiency considerations.

Dumbarton Rail Corridor Project

Delivery Method	Description	Benefits	Challenges
Design-Bid-Build (DBB)	<ul style="list-style-type: none"> <li>• Traditional project delivery method.</li> <li>• The owner, CBTP, would “own” the details of design during construction and as a result, is responsible for the costs of any errors or omissions encountered in construction.</li> <li>• Contractor is typically selected on low-bid.</li> </ul>	<ul style="list-style-type: none"> <li>• CBTP retains full control of design</li> <li>• Familiar to all entities</li> <li>• Systems in place</li> <li>• Difficult for bidders to challenge procurement process</li> </ul>	<ul style="list-style-type: none"> <li>• CBTP retains design risk</li> <li>• Not as fast as other delivery mechanisms</li> <li>• Limits innovation</li> <li>• Cost certainty achieved later than with other methods</li> </ul>
Design-Build (DB)	<ul style="list-style-type: none"> <li>• Procure both design and construction services in the same contract from a single, legal entity referred to as the design-builder.</li> <li>• Typically uses a two-step Request for Qualifications (RFQ)/ Request for Proposals (RFP) procedure.</li> <li>• Design-builder is typically selected on best value (price and technical).</li> <li>• Design-builder controls the details of design and is responsible for the costs of errors or omissions encountered in construction.</li> </ul>	<ul style="list-style-type: none"> <li>• Fastest delivery</li> <li>• Earliest cost certainty</li> <li>• Constructability maximized</li> <li>• Risk transferred to contractor</li> <li>• Encourages contractor innovation</li> </ul>	<ul style="list-style-type: none"> <li>• Agency familiarity</li> <li>• Increased risk of procurement challenge by proposers</li> <li>• Contractor controls final design</li> <li>• Third party approvals</li> </ul>
Design-Build-Operate-Maintain (DBOM)	<ul style="list-style-type: none"> <li>• Adds operations and maintenance to the design-build approach.</li> <li>• CBTP would provide design, construction, maintenance and handback standards to the contractor.</li> <li>• Eliminates the need for CBTP to provide or identify mechanisms for operations and maintenance.</li> </ul>	<ul style="list-style-type: none"> <li>• All benefits of design-build</li> <li>• Provides added quality benefit associated with transfer of long-term maintenance</li> <li>• Provides single contract for construction, maintenance, and operations</li> </ul>	<ul style="list-style-type: none"> <li>• All challenges of design-build</li> <li>• Requires CBTP to establish requirements for design, build, operations and maintenance requirements</li> </ul>

Dumbarton Rail Corridor Project

Delivery Method	Description	Benefits	Challenges
Construction Management General Contractor (CMGC)	<ul style="list-style-type: none"> <li>• CBTP would contract separately with a designer and a contractor entity.</li> <li>• Contractor input into the design development and constructability of complex projects represent key advantages.</li> <li>• Brings the builder into the design process at a stage where definitive input can have a positive impact on the project. Particularly valuable for non-standard types of designs where it is difficult for CBTP to develop the technical requirements that would be necessary for DB procurement without industry input.</li> <li>• Contractor is typically selected on qualifications. Price is negotiated as design progresses.</li> </ul>	<ul style="list-style-type: none"> <li>• Faster delivery</li> <li>• Earlier cost certainty</li> <li>• Constructability input</li> <li>• Risk mitigation</li> <li>• Innovation</li> <li>• CBTP retains full control of design</li> </ul>	<ul style="list-style-type: none"> <li>• CBTP retains design risk</li> <li>• Increased risk of procurement challenge by proposers</li> <li>• Obtaining competitive pricing</li> <li>• Delivery process learning curve</li> </ul>
Progressive Design-Build (PDB)	<ul style="list-style-type: none"> <li>• Combines attributes of CMGC and DB. CBTP would procure both design and construction services in the same contract from a single, legal entity referred to as the design-builder.</li> <li>• Design-builder is brought on board early and provides both design and constructability during design development.</li> <li>• Particularly valuable for non-standard types of designs where it is difficult for CBTP to develop the technical requirements that would be necessary for DB procurement without industry input but where CBTP still wants the ability to transfer design risk.</li> <li>• Design-builder is typically selected on qualifications.</li> <li>• Price is negotiated as design progresses.</li> </ul>	<ul style="list-style-type: none"> <li>• Faster delivery</li> <li>• Earlier cost certainty</li> <li>• Constructability input</li> <li>• Risk mitigation</li> <li>• Design risk transfer</li> <li>• Innovation</li> <li>• CBTP mostly retains control of design</li> </ul>	<ul style="list-style-type: none"> <li>• Increased risk of procurement challenge by proposers</li> <li>• Obtaining competitive pricing</li> <li>• Delivery process learning curve</li> </ul>

Attachment 1 – Regional Letters of Support



February 25, 2020

Ms. Therese McMillan  
 Executive Director  
 Metropolitan Transportation Commission  
 Bay Area Metro Center  
 375 Beale Street, Suite 800  
 San Francisco, CA 94105-2066

Dear Ms. McMillan:

We write to strongly encourage you to include the Dumbarton Rail Project (Project) in Plan Bay Area 2050. Repurposing the bridge to create a new transit option is essential to addressing existing and future congestion stretching from the Central Valley through the Dumbarton corridor to the San Francisco Peninsula and Silicon Valley. While the final analysis of this Project is not yet complete, it is evident to anyone who knows the region that rail or similar mass transit service across the Dumbarton rail bridge is essential to the economic health and peace of mind of tens of thousands of daily commuters.

This Project also carries great potential to leverage a significant amount of private sector investment in a project that provides unique benefits for the broader public. At a time when taxpayer resources are not sufficient to accomplish all of our transportation and mobility needs, not taking advantage of this potentially historic opportunity to collaborate with a willing private sector partner would be a big mistake.

As you know, the Project did not score well in the MTC's Project Performance Assessment process. It is our understanding that the benefit-cost ratio was less than 1:1 using MTC's model. We want to express our concerns with the model. It is our understanding that the methodology does not permit the inclusion of potential partnership funding from the private sector or other major employers that would benefit from the bridge's activation. Furthermore, we understand the assessment also indicated the project could improve in terms of MTC's equity analysis.

We understand the Project team is currently working with your staff to improve the Project's performance in addressing some of the shortcomings identified in the assessment process, including improvement in its equity scores. Improvement in the Project's standing can include modification to the project's future fare structure, including means-based fares, etc. Furthermore, we understand MTC will also look favorably on strong local funding commitments, including private sector funds.

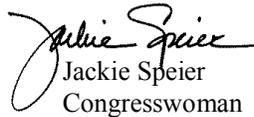
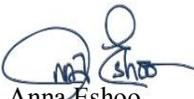
We have a once-in-a-lifetime opportunity for a public-private partnership in this project. There is a value added from this private contribution that likely does not exist with other proposed projects in the region. In fact, this added value is a stated objective of the Federal Transit Administration, which has looked favorably on this project thanks to its unique potential to capture private sector value that can eventually be used to leverage federal funds. We strongly advise MTC staff to look beyond the modelling and consider these very real factors when evaluating the merits of this project for inclusion in the Plan. For example, if the private sector agreed collectively to contribute \$1 billion to the project, what would the benefit – cost ratio look like at that point? The MTC could agree to request federal funding at a benefit – cost ratio that includes substantial private sector participation and decline to do so if the funding does not materialize.

We believe that would be fair provided the contribution expectations of MTC were reasonable, a determination that is possible through consultation with San Mateo County Transit District, the public partner in this project.

Finally, the United States Coast Guard is required to periodically determine if the bridge is a navigational hazard or a long-delayed transit project. We need to show progress to keep this public structure viable as a transit project.

Thank you for your consideration of our concerns.

All the best,

 Jackie Speier Congresswoman	 Anna Eshoo Congresswoman	 Kevin Mullin Assemblymember	 Marc Berman Assemblymember	 Jerry Hill Senator
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East Bay Economic Development Alliance  
[www.eastbayeda.org](http://www.eastbayeda.org)

April 2, 2020

Ms. Therese McMillan  
 Executive Director  
 Metropolitan Transportation Commission  
 Bay Area Metro Center  
 375 Beale Street, Suite 800  
 San Francisco, CA 94105-2066

Dear Ms. McMillan:

We are writing to strongly encourage you to include the Dumbarton Rail Corridor Project in Plan Bay Area 2050's long range constrained funding plan. The proposed project is being developed as a multimodal program that would connect with existing and planned mass transit from Caltrain's Redwood City/Sequoia Station to BART's Union City station, via the dormant Dumbarton Rail Corridor on the Peninsula, and following public rights-of-way in Alameda County.

As the cities and communities on either side of the Dumbarton Rail corridor continue to support higher housing densities and balance the job growth associated with our strong regional economy, it is imperative to offer commuters a viable mass transit alternative to driving private single occupancy vehicles on the Dumbarton Bridge. While important, the planned operational improvements in the Dumbarton Forward program will not provide enough relief from the quality of life impacts of traffic congestion for East Palo Alto, Fremont, Menlo Park, Newark, North Fair Oaks, Redwood City, and Union City. Additionally, some of the Bay Area's most impacted communities of concern are located adjacent to this corridor and suffer the public health impacts of today's Dumbarton-related traffic congestion.

Over the past 20 years this project has been studied and tabled many times due to more pressing transportation priorities or the lack of viable funding options. Now, for the first time, this project is advancing toward completed CEQA/NEPA documentation and approval because private sector contributions are funding 100% of the current phase of work. The potential to include private sector participation in the project funding plan makes the implementation of Dumbarton Rail Corridor service more possible than ever before.

At a time when taxpayer resources are not sufficient to fund all of our transportation and mobility needs, and the public infrastructure sector across North America continues to seek alternative funding and delivery partners, not taking advantage of this potentially significant opportunity to collaborate with a willing private sector would be an unfortunate missed opportunity, to the detriment of improving jobs – housing access for our residents.

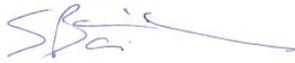
As an example, the US 101 Express Lane project from Redwood City to South San Francisco is already in the construction phase thanks in no small part to the investment of \$50 million in private sector contributions toward construction costs. This private sector participation propelled the project's SB1 Congested Corridors funding application to the top of the list. The power of a public-private partnership model to leverage support from major employers is no longer a hypothetical model in the Bay Area.

Equally important is the transformational potential of the project to move the goal of a seamless Bay Area transportation system forward significantly by providing an essential link between Caltrain, BART, ACE, Capital Corridor, and the planned Valley Link rail system. Moreover, the Dumbarton Rail Corridor Project would serve Priority Development Areas in Union City, Newark, East Palo Alto and Redwood City, as well as other High Resource Areas.

We have a never-before imagined opportunity for a public-private partnership on the Dumbarton Rail Corridor. The potential of this partnership has also attracted the interest of the Federal Transit Administration, which would be the preferred federal lead agency for the NEPA process. We strongly advise MTC staff to look beyond the modeling and consider these very real factors when evaluating the merits of this project for inclusion in the final version of Plan Bay Area 2050's long range constrained funding plan.

Thank you for your consideration of our request.

Sincerely,



Stephen Baiter, Executive Director  
East Bay Economic Development Alliance

Cc: Jim Hartnett, CEO, San Mateo County Transit District  
Tess Lengyel, Executive Director, Alameda County Transportation Commission  
Nuria Fernandez, CEO, Valley Transportation Agency



2001 Gateway Place, Suite 101E  
San Jose, California 95110  
(408)501-7864 svlg.org

April 1, 2020

CARL GUARDINO  
President & CEO

Ms. Therese McMillan  
Executive Director  
Metropolitan Transportation Commission  
Bay Area Metro Center  
375 Beale Street, Suite 800  
San Francisco, CA 95105-2066

**Board Officers:**  
STEVE MULLAGAN, Chair  
Western Digital Corporation  
JAMES GUTIERREZ, Vice Chair  
Auro  
RAQUEL GONZALEZ, Treasurer  
Bank of America  
GREG BECKER, Former Chair  
Silicon Valley Bank  
STEVE BERGLUND, Former Chair  
Trimble Inc.  
AART DE GEUS, Former Chair  
Synopsys  
TOM WERNER, Former Chair  
SunPower

**Re: Support for the Dumbarton Rail Corridor Project in Plan Bay Area 2050's long range plan**

Dear Ms. McMillan:

**Board Members:**  
BOBBY BELL  
KLA

**The Silicon Valley Leadership Group strongly recommends that the Metropolitan Transportation Commission include the Dumbarton Rail Corridor Project in Plan Bay Area 2050's long range constrained funding plan.**

DAWNET BEVERLEY  
Danneley Financial Solutions  
CARLA BORRAGNO  
Genentech  
CHRIS BOYD  
Kaiser Permanente  
RAM BRANTZKY  
Sapphire Ventures  
JOE BURTON  
Poly  
LISA DANIELS  
KPMG  
TOM FALLON  
Infirero  
VITAGE FOSTER  
AMF Media Group  
JOHN GAUDER  
Comcast  
KEN GOLDMAN  
Hillgrove  
DOUG GRAHAM  
Lockheed Martin  
LAURA GUID  
IBM  
STEFAN HECK  
Nautib  
ROBERT HOFFMAN  
Accenture  
ERIC HOUSER  
Wells Fargo Bank  
JULIA HU  
Lark

The Dumbarton Rail Corridor Project has the transformational potential to significantly advance the goal of a complete Bay Area transportation system by providing an essential link between Caltrain, BART, ACE, Capitol Corridor, and the planned Valley Link rail system.

The Silicon Valley Leadership Group was founded in 1978 by David Packard, Co-Founder of Hewlett Packard. Today, the Leadership Group is driven by more than 350 member companies to proactively tackle issues to improve our communities and strengthen our economy, with a focus on education, energy, the environment, health care, housing, tax policy, tech & innovation policy and transportation.

The Leadership Group has worked tirelessly for decades to secure funding to extend BART to San Jose, electrify Caltrain, establish ACE rail service, and more recently support Caltrain's Business Plan for a 2040 service vision to triple ridership. The Dumbarton Rail Corridor project is an essential link to connect BART, Caltrain, ACE, Capitol Corridor, and the future Valley Link across an existing southern San Francisco Bay crossing to address traffic congestion in Alameda, Santa Clara, and San Mateo Counties and beyond.

Given the job growth associated with our strong regional economy and the higher housing densities in the cities and communities on either side of the Dumbarton corridor, it is imperative to offer commuters a viable mass transit alternative to driving single-occupancy vehicles on the Dumbarton Bridge. This link will improve our quality of life, access to economic opportunity, and the health of our planet.

Thank you for your consideration of our request. We look forward to continuing work with Cross Bay Transit Partners and MTC, and supporting this crucial project moving forward.

Sincerely,

Cecilia Conley  
Senior Associate, Transportation & Housing  
Silicon Valley Leadership Group

BRENT LADD  
Straker  
JANET LAMKIN  
United Airlines  
ENRIQUE LORES  
HP Inc.  
ALAN LOWE  
Lumentum  
MATT MAHAN  
Beigade  
TARKAN MANER  
Newirth  
BEN MIVUCCI  
Alaska Airlines  
KATHLEEN MURRAY  
SAP  
BILL NAGEL  
San Francisco Chronicle  
STACY OWEN  
NBC Universal  
MARY PAPAZH

Attachment 2 – TIRCP Application Letters of Support



**CITY OF NEWARK, CALIFORNIA**

37101 Newark Boulevard • Newark, California 94560-3796 • (510) 578-4000 • FAX (510) 578-4306

January 16, 2020

David S. Kim, Secretary  
California State Transportation Agency  
915 Capitol Mall, Suite 350B  
Sacramento, CA 95814

RE: TIRCP FUNDING FOR DUMBARTON RAIL CORRIDOR PROJECT

Dear Secretary Kim:

I am writing on behalf of the City of Newark to express strong support for the San Mateo County Transit District's (District) application to the Transit and Intercity Rail Capital Program (TIRCP). The funding request will be used to advance and construct the Dumbarton Rail Corridor Project.

In August 2018, the San Mateo County Transit District (District) began partnering with Cross Bay Transit Partners (CBTP), a joint venture between Facebook and Plenary Group, to explore options to enhance mobility along the Dumbarton Rail Corridor. Together, the District and CBTP are exploring new, environmentally appropriate alternatives for a high quality, high-capacity public rail system.

The corridor has been the subject of feasibility studies since the early 1990s, when the District purchased the Dumbarton Rail Bridge from the Union Pacific Railroad, to address the growing demand for travel between the East Bay and Peninsula and lack of a high-capacity transit option across the southern portion of the Bay. Traffic congestion and the jobs-housing imbalance between the two sides of the Bay has grown significantly and will worsen if the corridor isn't improved to move more people in a safe, efficient, environmentally supportive manner.

Present efforts to improve transportation in the corridor have regained momentum due to availability of funding through the Metropolitan Transportation Commission's budgeted \$130 million for Corridor improvements in Regional Measure 3 (RM3) and through approval of San Mateo County's Measure W, which provides \$240 million for Regional Transit Connections.

The proposed project is to develop a passenger rail service connecting Redwood City and Caltrain along the Peninsula to the East Bay. The route is via a rebuilt Dumbarton Rail Bridge. The project is proposed as a multimodal transportation program consisting of enhanced bus service through the separate Dumbarton Forward program, the rail corridor between Redwood

City and the Tri-cities area (Newark-Fremont-Union City) as well as complementary bicycle and pedestrian facilities. Three modal alternatives (commuter rail, light rail, advanced/autonomous mass transit technology) are being studied and designed as part of the project development.

Also, as part of the broader multi-modal program, the rail line could connect to the existing and future rail network in Northern California, including BART, ACE and the Capitol Corridor to provide improved passenger connections between the East Bay, the Peninsula and the San Joaquin Valley.

Thank you for your consideration of the Transit and Intercity Capital Program grant application for the Dumbarton Rail Corridor Project.

Sincerely,

A handwritten signature in blue ink, appearing to read "Soren Fajeau", with a stylized flourish at the end.

Soren Fajeau, P.E.  
Public Works Director

**COMMUNITY DEVELOPMENT AND  
TRANSPORTATION DEPARTMENT**  
ENGINEERING & TRANSPORTATION DIVISION



**1017 Middlefield Road  
Redwood City, CA 94063  
(650) 780-7380  
Fax (650) 780-7309**

David S. Kim, Secretary  
California State Transportation Agency  
915 Capitol Mall, Suite 350B  
Sacramento, CA 95814

Dear Secretary Kim:

I am writing on behalf of the City of Redwood City to express strong support for the San Mateo County Transit District's (District) application to the Transit and Intercity Rail Capital Program (TIRCP). The funding request will be used to advance and construct the Dumbarton Rail Corridor Project.

The San Mateo County Transit District (District) and Cross Bay Transit Partners (CBTP), a joint venture between Facebook and Plenary Group, are exploring new, environmentally appropriate alternatives for a high quality, high-capacity public rail system to connect the East Bay and the Peninsula. Traffic congestion and the jobs-housing imbalance between the two sides of the Bay has grown significantly and will worsen if the corridor isn't improved to move more people in a safe, efficient, environmentally supportive manner. As a community that receives a significant number of employees coming from the East Bay, Redwood City is very interested in improving transit options for these commuters – to support our economy, to improve livability and safety by reducing congestion, and to address our greenhouse gas emission goals.

The proposed project is to develop a passenger rail service connecting Redwood City and Caltrain along the Peninsula to the East Bay. The multimodal nature of the project is particularly important to us in Redwood City as are the interfaces between the new service and Caltrain. Providing high-quality stations that are fully integrated into the surrounding neighborhood is critical to the success of the service and our city.

Our local economy is very much part of the regional economy as we're increasingly dependent on employees who live farther and farther away. With the broader multi-modal program, the rail line could connect to the existing and future rail network in Northern California, including BART, ACE and the Capitol Corridor to provide improved passenger connections between the East Bay, the Peninsula and the San Joaquin Valley.

Thank you for your consideration of the Transit and Intercity Capital Program grant application for the Dumbarton Rail Corridor Project.

Sincerely,

Jessica Manzi  
Transportation Manager  
City of Redwood City



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MONIQUE ZMUDA

January 13, 2020

JIM HARTNETT  
EXECUTIVE DIRECTOR

David S. Kim, Secretary  
California State Transportation Agency  
915 Capitol Mall, Suite 350B  
Sacramento, CA 95814

Dear Secretary Kim:

I am writing on behalf of Peninsula Corridor Joint Powers Board (PCJPB) to express support for the San Mateo County Transit District's (District) application to the Transit and Intercity Rail Capital Program (TIRCP). The funding request will be used to advance and construct the Dumbarton Rail Corridor Project, which will connect to the Caltrain system at Redwood City.

Caltrain has advanced a Long Range Service Vision that will ensure Caltrain provides fast, frequent service all day, every day, with a path toward incremental growth. Caltrain's 2040 plans include capacity improvements at stations that will support refocused growth and development and intermodal connectivity. Caltrain, Redwood City and the San Mateo County Transit District (District) will partner to ensure seamless integration of services at Redwood City.

The Dumbarton Rail Corridor had been the subject of feasibility studies since the early 1990s, when the District purchased the Dumbarton Rail Bridge from the Union Pacific Railroad, to address the growing demand for travel between the East Bay and Peninsula and lack of a high-capacity transit option across the southern portion of the Bay. Traffic congestion and the jobs-housing imbalance between the two sides of the Bay has grown significantly and will worsen if the corridor isn't improved to move more people in a safe, efficient, environmentally supportive manner. The District has renewed interest and opportunity in the corridor that began in August 2018, when it entered into an agreement with Cross Bay Transit Partners (CBTP), a joint venture between Facebook and Plenary Group, to explore options to enhance mobility along the Dumbarton Rail Corridor. For Caltrain, this presents a key link for its users to BART, ACE and the Capitol Corridor to provide improved passenger connections between the East Bay, the Peninsula and the San Joaquin Valley.

**PENINSULA CORRIDOR JOINT POWERS BOARD**  
1250 San Carlos Ave. – P.O. Box 3006  
San Carlos, CA 94070-1306

Mr. David S. Kim, Secretary  
January 13, 2020  
Page 2

The proposed project is to develop a passenger rail service connecting Redwood City and Caltrain along the Peninsula to the East Bay. The route is via a rebuilt Dumbarton Rail Bridge. The project is proposed as a multimodal transportation program consisting of enhanced bus service through the separate Dumbarton Forward program, the rail corridor between Redwood City and the Tri-cities area (Newark-Fremont-Union City) as well as complementary bicycle and pedestrian facilities. Three modal alternatives (commuter rail, light rail, advanced/autonomous mass transit technology) are being studied and designed as part of the project development. This application includes the phase of the project within District right-of-way between Redwood City, connecting to Caltrain, to Newark on the East Bay.

Thank you for your consideration of the Transit and Intercity Capital Program grant application for the Dumbarton Rail Corridor Project.

Sincerely,

A handwritten signature in black ink, appearing to read "Michelle Bouchard", followed by the word "for" in a smaller, cursive font.

Michelle Bouchard  
Chief Operating Officer, Rail

**PENINSULA CORRIDOR JOINT POWERS BOARD**  
1250 San Carlos Ave. – P.O. Box 3006  
San Carlos, CA 94070-1306



**SAN JOAQUIN  
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Executive Director, **Stacey Mortensen**

Commissioner, **Nancy Young**, City of Tracy  
Commissioner, **Bob Elliott**, San Joaquin County  
Commissioner, **Scott Haggerty**, Alameda County  
Commissioner, **John Marchand**, City of Livermore

January 10, 2020

David S. Kim, Secretary  
California State Transportation Agency  
915 Capitol Mall, Suite 350B  
Sacramento, CA 95814

RE: Support for Dumbarton Rail Corridor 2020 TIRCP Application

Dear Secretary Kim:

I am writing on behalf of San Joaquin Regional Rail Commission (SJRRC), the owner/operator of the Altamont Corridor Express (ACE) rail service to express strong support for the San Mateo County Transit District's (District) application to the Transit and Intercity Rail Capital Program (TIRCP). The funding request will be used to advance and construct the Dumbarton Rail Corridor Project. This corridor is a critical component of the 2018 State Rail Plan and is key to connecting the Northern San Joaquin Valley and the East Bay to the Peninsula. We are working with the District to make sure that ACE expansion is well coordinated with the Dumbarton Rail Corridor Project.

In August 2018, the San Mateo County Transit District (District) began partnering with Cross Bay Transit Partners (CBTP), a joint venture between Facebook and Plenary Group, to explore options to enhance mobility along the Dumbarton Rail Corridor. Together, the District and CBTP are exploring new, environmentally appropriate alternatives for a high quality, high-capacity public rail system.

The corridor has been the subject of feasibility studies since the early 1990s, when the District purchased the Dumbarton Rail Bridge from the Union Pacific Railroad, to address the growing demand for travel between the East Bay and Peninsula and lack of a high-capacity transit option across the southern portion of the Bay. Traffic congestion and the jobs-housing imbalance between the two sides of the Bay has grown significantly and will worsen if the corridor isn't improved to move more people in a safe, efficient, environmentally supportive manner.

Present efforts to improve transportation in the corridor have regained momentum due to availability of funding through the Metropolitan Transportation Commission's budgeted \$130 million for Corridor improvements in Regional Measure 3 (RM3) and through approval of San Mateo County's Measure W, which provides \$240 million for Regional Transit Connections.



[www.acerail.com](http://www.acerail.com)

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The proposed project is to develop a passenger rail service connecting Redwood City and Caltrain along the Peninsula to the East Bay. The route is via a rebuilt Dumbarton Rail Bridge. The project is proposed as a multimodal transportation program consisting of enhanced bus service through the separate Dumbarton Forward program, the rail corridor between Redwood City and the Tri-cities area (Newark-Fremont-Union City) as well as complementary bicycle and pedestrian facilities. Three modal alternatives (commuter rail, light rail, advanced/autonomous mass transit technology) are being studied and designed as part of the project development.

Also, as part of the broader multi-modal program, the rail line could connect to the existing and future rail network in Northern California, including BART, ACE and the Capitol Corridor to provide improved passenger connections between the East Bay, the Peninsula and the San Joaquin Valley.

Thank you for your consideration of the Transit and Intercity Capital Program grant application for the Dumbarton Rail Corridor Project.

Sincerely,



Stacey Mortensen  
Executive Director, SJRRC



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- Boardmember Leo Zuber**  
*Commissioner, ACE*
- Michael Tree**  
*Executive Director*

January 10, 2020

David S. Kim, Secretary  
California State Transportation Agency  
915 Capitol Mall, Suite 350B  
Sacramento, CA 95814

RE: Support for Dumbarton Rail Corridor 2020 TIRCP Application

Dear Secretary Kim:

I am writing on behalf of the Tri-Valley – San Joaquin Valley Regional Rail Authority to express strong support for the San Mateo County Transit District’s (District) application to the Transit and Intercity Rail Capital Program (TIRCP). The funding request will be used to advance and construct the Dumbarton Rail Corridor Project. This corridor is a critical component of the 2018 State Rail Plan and is key to connecting the Northern San Joaquin Valley and the East Bay to the Peninsula. We are working with the District to make sure that ACE expansion is well coordinated with the Dumbarton Rail Corridor Project.

In August 2018, the San Mateo County Transit District (District) began partnering with Cross Bay Transit Partners (CBTP), a joint venture between Facebook and Plenary Group, to explore options to enhance mobility along the Dumbarton Rail Corridor. Together, the District and CBTP are exploring new, environmentally appropriate alternatives for a high quality, high-capacity public rail system.

The corridor has been the subject of feasibility studies since the early 1990s, when the District purchased the Dumbarton Rail Bridge from the Union Pacific Railroad, to address the growing demand for travel between the East Bay and Peninsula and lack of a high-capacity transit option across the southern portion of the Bay. Traffic congestion and the jobs-housing imbalance between the two sides of the Bay has grown significantly and will worsen if the corridor isn’t improved to move more people in a safe, efficient, environmentally supportive manner.

Present efforts to improve transportation in the corridor have regained momentum due to availability of funding through the Metropolitan Transportation Commission’s budgeted \$130 million





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*LAVTA Boardmember*

**Boardmember Leo Zuber**

*Commissioner, ACE*

**Michael Tree**

*Executive Director*

for Corridor improvements in Regional Measure 3 (RM3) and through approval of San Mateo County's Measure W, which provides \$240 million for Regional Transit Connections.

The proposed project is to develop a passenger rail service connecting Redwood City and Caltrain along the Peninsula to the East Bay. The route is via a rebuilt Dumbarton Rail Bridge. The project is proposed as a multimodal transportation program consisting of enhanced bus service through the separate Dumbarton Forward program, the rail corridor between Redwood City and the Tri-cities area (Newark-Fremont-Union City) as well as complementary bicycle and pedestrian facilities. Three modal alternatives (commuter rail, light rail, advanced/autonomous mass transit technology) are being studied and designed as part of the project development.

Also, as part of the broader multi-modal program, the rail line could connect to the existing and future rail network in Northern California, including BART, ACE and the Capitol Corridor to provide improved passenger connections between the East Bay, the Peninsula and the San Joaquin Valley.

Thank you for your consideration of the Transit and Intercity Capital Program grant application for the Dumbarton Rail Corridor Project.

Sincerely,

Michael Tree  
Executive Director



STATE CAPITOL  
P.O. BOX 942849  
SACRAMENTO, CA 94249-0024  
(916) 319-2024  
FAX (916) 319-2124

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LOS ALTOS, CA 94022  
(650) 691-2121  
FAX (650) 691-2120

WEBSITE  
[www.assembly.ca.gov/berman](http://www.assembly.ca.gov/berman)

# Assembly California Legislature



**MARC BERMAN**  
ASSEMBLYMEMBER, TWENTY-FOURTH DISTRICT

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JOBS, ECONOMIC DEVELOPMENT, AND  
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TRANSPORTATION

## SELECT COMMITTEES

CHAIR: MASTER PLAN FOR HIGHER  
EDUCATION IN CALIFORNIA

## SPECIAL COMMITTEES

LEGISLATIVE ETHICS

February 21, 2020

David S. Kim, Secretary  
California State Transportation Agency  
915 Capitol Mall, Suite 350B  
Sacramento, CA 95814

Dear Secretary Kim:

I am writing to express my strong support for the San Mateo County Transit District's (District) application to the Transit and Intercity Rail Capital Program (TIRCP). The funding request will be used to advance and construct the Dumbarton Rail Corridor Project.

The Dumbarton Rail Corridor has been the subject of feasibility studies since the early 1990s with the goal of addressing the growing travel demand between the East Bay and Peninsula and the lack of a high-capacity transit option across the southern portion of the Bay. Traffic congestion and the jobs-housing imbalance between the two sides of the Bay has grown significantly and will worsen if the corridor isn't improved to move more people in a safe, efficient, and sustainable manner.

In August 2018, the San Mateo County Transit District (District) began partnering with Cross Bay Transit Partners (CBTP), a joint venture between Facebook and Plenary Group, to explore options to enhance mobility along the Dumbarton Rail Corridor. Together, the District and CBTP are exploring new, environmentally appropriate alternatives for a high-quality, high-capacity public transit system.

Current efforts to improve transportation in the corridor have regained momentum due to availability of funding through the Metropolitan Transportation Commission's budgeted \$130 million for Corridor improvements in Regional Measure 3 (RM3) and through approval of San Mateo County's Measure W, which provides \$240 million for Regional Transit Connections.

The Dumbarton Rail Corridor Project would develop a high-capacity transit service connecting Redwood City and Caltrain along the Peninsula to the East Bay via a rebuilt Dumbarton Rail Bridge. The project is proposed as a multi-modal transportation program consisting of enhanced bus service through the separate Dumbarton Forward program, the rail corridor between Redwood City and the Tri-cities area (Newark-Fremont-Union City) as well as complementary bicycle and pedestrian facilities. Three modal alternatives (commuter rail, light rail, advanced/autonomous mass transit technology) are being studied and designed as part of the project. The requested TIRCP funding would support the construction of the common alignment between Redwood City and Newark with five stations.

Additionally, the rail line would provide multi-modal connectivity to the existing and future rail network in Northern California, including BART, ACE and the Capitol Corridor to provide improved passenger connections between the East Bay, the Peninsula and the San Joaquin Valley.

Thank you for your consideration of the Transit and Intercity Capital Program grant application for the Dumbarton Rail Corridor Project.

Sincerely,

MARC BERMAN  
Assemblymember, 24<sup>th</sup> District



Printed on Recycled Paper

# California State Senate

SENATOR  
JERRY HILL

THIRTEENTH SENATE DISTRICT



CAPITOL OFFICE  
STATE CAPITOL  
SACRAMENTO, CA 95814  
TEL (916) 651-4013  
FAX (916) 651-4913

DISTRICT OFFICE  
1528 S. EL CAMINO REAL  
SUITE 303  
SAN MATEO, CA 94402  
TEL (650) 212-3313  
FAX (650) 212-3320

WWW.SENATE.CA.GOV/HILL  
SENATOR.HILL@SENATE.CA.GOV

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ECONOMIC DEVELOPMENT  
ENERGY, UTILITIES &  
COMMUNICATIONS  
ENVIRONMENTAL QUALITY  
GOVERNMENTAL ORGANIZATION

February 19, 2020

David S. Kim, Secretary  
California State Transportation Agency  
915 Capitol Mall, Suite 350B  
Sacramento, CA 95814

**RE: Support for San Mateo County Transit District TIRCP application**

Dear Secretary Kim:

I am writing to express my strong support for the San Mateo County Transit District's (District) application to the Transit and Intercity Rail Capital Program (TIRCP). The funding request will be used to advance and construct the Dumbarton Rail Corridor Project.

The Dumbarton Rail Corridor has been the subject of feasibility studies since the early 1990s with the goal of addressing the growing travel demand between the East Bay and Peninsula and the lack of a high-capacity transit option across the southern portion of the Bay. Traffic congestion and the jobs-housing imbalance between the two sides of the Bay has grown significantly and will worsen if the corridor isn't improved to move more people in a safe, efficient, and sustainable manner.

In August 2018, the San Mateo County Transit District (District) began partnering with Cross Bay Transit Partners (CBTP), a joint venture between Facebook and Plenary Group, to explore options to enhance mobility along the Dumbarton Rail Corridor. Together, the District and CBTP are exploring new, environmentally appropriate alternatives for a high-quality, high-capacity public transit system.

Current efforts to improve transportation in the corridor have regained momentum due to availability of funding through the Metropolitan Transportation Commission's budgeted \$130 million for Corridor improvements in Regional Measure 3 (RM3) and through approval of San Mateo County's Measure W, which provides \$240 million for Regional Transit Connections.

The Dumbarton Rail Corridor Project would develop a high-capacity transit service connecting Redwood City and Caltrain along the Peninsula to the East Bay via a rebuilt Dumbarton Rail Bridge. The project is proposed as a multi-modal transportation program consisting of enhanced bus service through the separate Dumbarton Forward program, the rail corridor between Redwood City and the Tri-cities area (Newark-Fremont-Union City) as well as complementary bicycle and pedestrian facilities. Three modal alternatives (commuter rail, light rail, advanced/autonomous mass transit technology) are being studied

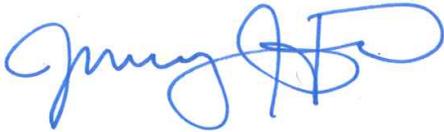


and designed as part of the project. The requested TIRCP funding would support the construction of the common alignment between Redwood City and Newark with five stations.

Additionally, the rail line would provide multi-modal connectivity to the existing and future rail network in Northern California, including BART, ACE and the Capitol Corridor to provide improved passenger connections between the East Bay, the Peninsula and the San Joaquin Valley.

Thank you for your consideration of the Transit and Intercity Capital Program grant application for the Dumbarton Rail Corridor Project.

Sincerely,



**JERRY HILL**  
Senator, 13<sup>th</sup> District

STATE CAPITOL  
SACRAMENTO, CA 95814  
TEL (916) 651-4015  
FAX (916) 651-4915

2105 S. BASCOM AVE.  
SUITE 154  
CAMPBELL, CA 95008  
TEL (408) 558-1295  
FAX (408) 558-1296

100 PASEO DE SAN ANTONIO  
SUITE 209  
SAN JOSE, CA 95113  
TEL (408) 286-8318  
FAX (408) 286-2338

## California State Senate

SENATOR  
JIM BEALL

FIFTEENTH SENATE DISTRICT



COMMITTEES  
TRANSPORTATION  
CHAIR

BUDGET AND  
FISCAL REVIEW

GOVERNANCE  
AND FINANCE

HUMAN SERVICES

SUBCOMMITTEE  
BUDGET AND FISCAL  
REVIEW SUBCOMMITTEE #5  
ON CORRECTIONS,  
PUBLIC SAFETY, AND  
THE JUDICIARY

February 25, 2020

David S. Kim, Secretary  
California State Transportation Agency  
915 Capitol Mall, Suite 350B  
Sacramento, CA 95814

Dear Secretary Kim:

I am writing to express my strong support for the San Mateo County Transit District's (District) application to the Transit and Intercity Rail Capital Program (TIRCP). The funding request will be used to advance and construct the Dumbarton Rail Corridor Project.

The Dumbarton Rail Corridor has been the subject of feasibility studies since the early 1990s with the goal of addressing the growing travel demand between the East Bay and Peninsula and the lack of a high-capacity transit option across the southern portion of the Bay. Traffic congestion and the jobs-housing imbalance between the two sides of the Bay has grown significantly and will worsen if the corridor isn't improved to move more people in a safe, efficient, and sustainable manner.

In August 2018, the San Mateo County Transit District (District) began partnering with Cross Bay Transit Partners (CBTP), a joint venture between Facebook and Plenary Group, to explore options to enhance mobility along the Dumbarton Rail Corridor. Together, the District and CBTP are exploring new, environmentally appropriate alternatives for a high-quality, high-capacity public transit system.

Current efforts to improve transportation in the corridor have regained momentum due to availability of funding through the Metropolitan Transportation Commission's budgeted \$130 million for Corridor improvements in Regional Measure 3 (RM3) and through approval of San Mateo County's Measure W, which provides \$240 million for Regional Transit Connections.

The Dumbarton Rail Corridor Project would develop a high-capacity transit service connecting Redwood City and Caltrain along the Peninsula to the East Bay via a rebuilt Dumbarton Rail Bridge. The project is proposed as a multi-modal transportation program consisting of enhanced bus service through the separate Dumbarton Forward program, the rail corridor between Redwood City and the Tri-cities area (Newark-Fremont-Union City) as well as complementary bicycle and pedestrian facilities. Three modal alternatives (commuter rail, light rail, advanced/autonomous mass transit technology) are being studied and designed as part of the project. The requested TIRCP funding would support the construction of the common alignment between Redwood City and Newark with five stations.



Additionally, the rail line would provide multi-modal connectivity to the existing and future rail network in Northern California, including BART, ACE and the Capitol Corridor to provide improved passenger connections between the East Bay, the Peninsula and the San Joaquin Valley.

Thank you for your consideration of the Transit and Intercity Capital Program grant application for the Dumbarton Rail Corridor Project.

Sincerely,

  
Jim Beall  
Senator, District 15

CAPITOL OFFICE  
STATE CAPITOL  
ROOM 4085  
SACRAMENTO, CA 95814  
TEL (916) 651-4010  
FAX (916) 651-4910

DISTRICT OFFICE  
39510 PASEO PADRE PKWY.  
SUITE 280  
FREMONT, CA 94538  
TEL (510) 794-3900

WWW.SEN.CA.GOV/WIECKOWSKI

# California State Senate

SENATOR  
**BOB WIECKOWSKI**  
TENTH SENATE DISTRICT



CHAIR  
BUDGET SUBCOMMITTEE #2  
MEMBER  
APPROPRIATIONS  
BUDGET AND FISCAL REVIEW  
ENVIRONMENTAL QUALITY  
HOUSING  
JUDICIARY  
TRANSPORTATION

February 18, 2020

David S. Kim, Secretary  
California State Transportation Agency  
915 Capitol Mall, Suite 350B  
Sacramento, CA 95814

Dear Secretary Kim:

I am writing to express my strong support for the San Mateo County Transit District's (District) application to the Transit and Intercity Rail Capital Program (TIRCP). The funding request will be used to advance and construct the Dumbarton Rail Corridor Project.

The Dumbarton Rail Corridor has been the subject of feasibility studies since the early 1990s with the goal of addressing the growing travel demand between the East Bay and Peninsula and the lack of a high-capacity transit option across the southern portion of the Bay. Traffic congestion and the jobs-housing imbalance between the two sides of the Bay has grown significantly and will worsen if the corridor isn't improved to move more people in a safe, efficient, and sustainable manner.

In August 2018, the San Mateo County Transit District (District) began partnering with Cross Bay Transit Partners (CBTP), a joint venture between Facebook and Plenary Group, to explore options to enhance mobility along the Dumbarton Rail Corridor. Together, the District and CBTP are exploring new, environmentally appropriate alternatives for a high-quality, high-capacity public transit system.

Current efforts to improve transportation in the corridor have regained momentum due to availability of funding through the Metropolitan Transportation Commission's budgeted \$130 million for Corridor improvements in Regional Measure 3 (RM3) and through approval of San Mateo County's Measure W, which provides \$240 million for Regional Transit Connections.

The Dumbarton Rail Corridor Project would develop a high-capacity transit service connecting Redwood City and Caltrain along the Peninsula to the East Bay via a rebuilt Dumbarton Rail Bridge. The project is proposed as a multi-modal transportation program consisting of enhanced bus service through the separate Dumbarton Forward program, the rail corridor between Redwood City and the Tri-cities area (Newark-Fremont-Union City) as well as complementary bicycle and pedestrian facilities. Three modal alternatives (commuter rail, light rail, advanced/autonomous mass transit technology) are being studied and designed as part of the project. The requested TIRCP funding would support the construction of the common alignment between Redwood City and Newark with five stations.

Additionally, the rail line would provide multi-modal connectivity to the existing and future rail network in Northern California, including BART, ACE and the Capitol Corridor to provide improved passenger connections between the East Bay, the Peninsula and the San Joaquin Valley.



PRINTED ON RECYCLED PAPER

Thank you for your consideration of the Transit and Intercity Capital Program grant application for the Dumbarton Rail Corridor Project.

Sincerely,

*Robert A. Wieckowski*

**Bob Wieckowski**  
**Senator, 10th Senate District**

STATE CAPITOL  
P.O. BOX 942849  
SACRAMENTO, CA 94249-0022  
(916) 319-2022  
FAX (916) 319-2122

DISTRICT OFFICE  
1528 S. EL CAMINO REAL, SUITE 302  
SAN MATEO, CA 94402  
(650) 349-2200  
FAX (650) 341-4676

# Assembly California Legislature



**KEVIN MULLIN**  
SPEAKER PRO TEMPORE  
ASSEMBLYMEMBER, TWENTY-SECOND DISTRICT

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BUSINESS AND PROFESSIONS  
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REVENUE AND TAXATION

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BUDGET SUBCOMMITTEE NO. 3 ON  
RESOURCES AND TRANSPORTATION

**SELECT COMMITTEES**  
CHAIR: BIOTECHNOLOGY

CALIFORNIA WORKFORCE  
DEVELOPMENT BOARD

February 26, 2020

David S. Kim, Secretary  
California State Transportation Agency  
915 Capitol Mall, Suite 350B  
Sacramento, CA 95814

Dear Secretary Kim:

I am writing to express my strong support for the San Mateo County Transit District's (District) application to the Transit and Intercity Rail Capital Program (TIRCP). The funding request will be used to advance and construct the Dumbarton Rail Corridor Project.

The Dumbarton Rail Corridor has been the subject of feasibility studies since the early 1990s with the goal of addressing the growing travel demand between the East Bay and Peninsula and the lack of a high-capacity transit option across the southern portion of the Bay. Traffic congestion and the jobs-housing imbalance between the two sides of the Bay has grown significantly and will worsen if the corridor isn't improved to move more people in a safe, efficient, and sustainable manner.

In August 2018, the San Mateo County Transit District (District) began partnering with Cross Bay Transit Partners (CBTP), a joint venture between Facebook and Plenary Group, to explore options to enhance mobility along the Dumbarton Rail Corridor. Together, the District and CBTP are exploring new, environmentally appropriate alternatives for a high-quality, high-capacity public transit system.

Current efforts to improve transportation in the corridor have regained momentum due to availability of funding through the Metropolitan Transportation Commission's budgeted \$130 million for Corridor improvements in Regional Measure 3 (RM3) and through approval of San Mateo County's Measure W, which provides \$240 million for Regional Transit Connections.

The Dumbarton Rail Corridor Project would develop a high-capacity transit service connecting Redwood City and Caltrain along the Peninsula to the East Bay via a rebuilt Dumbarton Rail Bridge. The project is proposed as a multi-modal transportation program consisting of enhanced bus service through the separate Dumbarton Forward program, the rail corridor between Redwood City and the Tri-cities area (Newark-Fremont-Union City) as well as complementary bicycle and pedestrian facilities. Three modal alternatives (commuter rail, light rail, advanced/autonomous mass transit technology) are being studied and designed as part of the project. The requested TIRCP funding would support the construction of the common alignment between Redwood City and Newark with five stations.

Additionally, the rail line would provide multi-modal connectivity to the existing and future rail network in Northern California, including BART, ACE and the Capitol Corridor to provide improved passenger connections between the East Bay, the Peninsula and the San Joaquin Valley.

Thank you for your consideration of the Transit and Intercity Capital Program grant application for the Dumbarton Rail Corridor Project.

Sincerely,

Kevin Mullin  
Speaker pro Tempore, California State Assembly  
District 22



Printed on Recycled Paper



DATE: June 26, 2020  
 TO: STA Board  
 FROM: Robert Guerrero, STA Planning Director  
 RE: MTC Plan Bay Area Letter of Commitment for STA Priority Projects

**Background:**

The Solano Transportation Authority is responsible for coordinating with the Metropolitan Transportation Commission (MTC) and Caltrans to develop the Regional Transportation Plan (RTP) for the Bay Area every four years. The RTP is a long range transportation plan that forecasts future transportation needs. As required by California Senate Bill 375, the RTP also includes a component that promotes sustainable communities and provides policies to reduce greenhouse gas emissions. Another important aspect of the RTP is that it is the required regional planning document for programming federal funds.

Over the past year, the STA Board submitted priority transportation projects and programs for inclusion in the new RTP. As part of this process, MTC staff analyzed high cost projects (i.e. \$250 million or more) in an effort to gauge how they performed towards addressing the regions goals and objectives. Projects that performed low may can ultimately not be included in the RTP and therefore, not be eligible for future federal and state funding.

Three priority projects that underwent this project performance assessment process in Solano County were:

1. I-80/I-680/State Route (SR) 12 Interchange
2. I-80 Express/Managed Lanes
3. SR 37 Corridor Project

**Discussion:**

All three projects were assessed by MTC's RTP Guiding Principles, Benefit to Cost Ratio and Equity. As a result, the projects were categorized as "Under Consideration" for being removed from the RTP unless commitments were made to address areas that scored poorly in their assessment. MTC requested letters of commitment towards improving the project performance assessment initially submitted by staff. In response, STA staff and its partners drafted letters and submitted letters to MTC for the I-80/I-680/SR 12 Interchange and the SR 37 Corridor Project. A third letter for the I-80 Express/Managed Lanes is currently under consideration. MTC has since requested that the letters of commitment be approved by each County Transportation Agency (i.e. STA Board) by August 31<sup>st</sup>.

Attached are the submitted Letters of Commitment for the I-80/I-680/SR 12 Interchange and the SR 37 Corridor Project (Attachments A and B). In addition, the draft I-80 Express/Managed Lane Letter of Commitment is also attached (Attachment C). Each letter notes areas where the project scored low in MTC's Project Performance Assessment and provides solutions to address them. The Interchange Project is primarily a STA and Caltrans sponsored project, areas noted for improvement were related to two of MTC's RTP Guiding Principles: Green House Gas Emission Reduction and Economic Vibrancy, as well the Equity assessment. The SR 37 Corridor Project is a multi-

agency project and had primarily scored low in the Benefit to Cost assessment and Equity assessment. The I-80 Express/Managed Lane Project is similar to SR 37 because it is also a multi-agency project and primarily scored low in the Equity assessment.

Each letter clarifies how it will address MTC's performance assessment and in some cases, refutes MTC's assessment. For example, the Interchange project highlights how it would address GHG emissions by supporting SolanoExpress Bus Transit as well as removing barriers to local Active Transportation Projects and Transportation Demand Strategies. For SR 37 and the I-80 Express Lanes, the Equity assessment was addressed by exploring strategies such as means based tolling options. Further details are included in the attached letters. STA staff is recommending the STA Board formally approve each letter of commitment in order for each project to be included in the PBA 2050 RTP. Otherwise, each project will not be eligible for future state and federal funding.

**Fiscal Impact:**

None to the STA General Fund; however, future funding for Solano County's priority transportation projects may be in jeopardy (i.e. I-80/I-680/SR 12 Interchange, SR 37 Corridor and I-80 Expressed/Managed Lanes Project).

**Recommendation:**

Approve Plan Bay Area 2050 Letters of Commitment as included in Attachments A, B and C for the following Solano County Projects:

1. I-80/I-680/SR 12 Interchange Project
2. SR 37 Corridor Project
3. I-80 Express/Managed Lanes Project

**Attachments:**

1. Letter of Commitment for the I-80/I-680/SR 12 Interchange Project
2. Letter of Commitment for the SR 37 Corridor Project
3. Letter of Commitment for the I-80 Express/Managed Lanes Project



Solano Transportation Authority

... working for you!

## SOLANO TRANSPORTATION AUTHORITY

### Member Agencies:

Benicia • Dixon • Fairfield • Rio Vista • Suisun City • Vacaville • Vallejo • Solano County

One Harbor Center, Ste. 130, Suisun City, CA 94585-2473 • Phone (707) 424-6075 / Fax (707) 424-6074  
Email: info@sta.ca.gov • Website: sta.ca.gov

April 10, 2020

**Via Electronic Mail**

Page 1 of 3

Ms. Alix Bockelman  
Deputy Executive Director, Policy  
Metropolitan Transportation Commission  
375 Beale Street, Suite 800  
San Francisco, CA 94105-2006

**RE: I-80/I-680/SR 12 Interchange Project Performance Assessment**

Dear Ms. Alix Bockelman:

We appreciate the opportunity to respond to the Plan Bay Area Project Performance Assessment of the I-80/I-680/SR 12 Interchange Project in Solano County.

The I-80/I-680/SR 12 Interchange Project is a multi-year, multi-phase project that includes a realignment of I-680, an improved direct connector route between I-80 and Highway 12, construction of new interchange overcrossings, new entrance/exit ramps, bike/pedestrian improvements, safety improvements, and the extension of some local streets leading to I-80 and Highway 12.

The I-80/I-680/SR 12 Interchange Project will improve:

- transit reliability
- travel times
- impacts to cut-through traffic on local streets
- improve safety by streamlining connections for freight
- transit and commuters transitioning between these three major state routes linking the Bay Area, the Napa Valley, and Sacramento

This Project has been a priority project for Solano County over the past two Regional Transportation Plans (RTP) and continues to be a top priority for this current RTP.

Overall the project met the majority of the Project Performance Assessment's Guiding Principles, Benefit to Cost Ratio and Equity Assessment. For the few items that the Project was assessed less than positive, we offer the following responses and commitments:

1. Guiding Principles

a) *Support Healthy Principle by decreasing Green House Gas emissions and reduce Vehicle Miles Traveled*

The STA is committed to reducing greenhouse gas emissions for this project as part of the expansion of the Solano Managed Lanes Network and SolanoExpress transit services. The Project is also committed removing barriers for active transportation along each phase of the interchange. In addition, the STA's Solano Mobility Program is also committed to promoting commuter options with live commute consultants assisting users in navigating different incentives and commute programs that support the Interchange project. The STA and its partners will continue to complete I-80 Managed

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STA Ltr. To MTC's ABockelman dated April 10, 2020  
 RE: I-80/I-680/SR 12 Interchange Projects Performance Assessment

Lanes Network to provide more convenient and attractive options for bus transit riders, carpool and vanpool ridership. The STA is also committed to coordinating with MTC, the Bay Area and Yolo-Solano Air Quality Management Districts, to develop a coordinated Transportation Demand Management Strategy for the I-80 and I-680 corridors. This will provide a consistent and user friendly approach to marketing transit and carpooling services in conjunction with the STA's Solano Mobility Program.

The STA is also committed to reduce GHGs for the Project and other areas of the County through a multi-phased approach that involves electrification of the SolanoExpress Bus fleet and installation of electric charging stations. The SolanoExpress transit operators (Soltrans and FAST) have already begun investing in an electric fleet conversion for express bus service through the Interchange Project. Planned improvements to the Interchange will make the express bus service more attractive and will increase ridership. Further, the STA and its Air District Partners are also providing Clean Air funding of at least \$100k in matching funds to install charging stations for electric vehicles.

*b) Support Vibrant Principle by reducing job elimination*

The predominant land use of the parcels affected by the realignment of I-680 and the new I-680/I-80/SR 12 West interchange are industrial and warehousing. The STA is committed to relocating businesses consistent with mitigation measures identified in the project's Environmental Documents as part of the project cost and in accordance with FHWA and Caltrans guidelines. The County currently has capacity to relocate these businesses in near proximity to the Interchange area to the fullest extent possible.

A Countywide Economic Study completed in 2017 called Moving Solano Forward, identified 1,016 acres of tier 1 (shovel ready) industrial sites and an additional 1,000 acres of tier 2 (need a small degree of improvements to become shovel ready). In the short term, there would be some disruption to the impacted business; however, there is ample available land for them to relocate within Solano County, so jobs would likely not be impacted. In addition, the jobs created from the construction of the project also needs to be taken into account. Construction alone for Packages 2a, 2, and 3 was estimated to create approximately 4,407 jobs with additional economic benefits from travel time delay reduction. The biggest benefit of the project in the long term is economic benefits from congestion relief and better access for the Solano Business Parks to the corridor. The same economic study concluded that relieving traffic congestion would remove one of the major obstacles that Solano County faces from a business creation standpoint and would create jobs with greater freeway access.

2. Equity Score: Challenge Rating for Rising Tides/Falling Fortunes Category

The Project's low challenge rating was due to the Project theoretically benefiting higher income earners rather than low income users. However, what needs to be included in the analysis is that Solano County includes the three most diverse cities (Vallejo, Fairfield and Suisun City) in the Bay Area and it is the most affordable county in the Bay Area. The Project benefits all users and is committed to addressing transportation equity countywide, as well as through the I-80/I-680/SR 12 Interchange Project. The Project improvements will help address congestion obstacles that Solano workers face when traveling locally and accessing their jobs in the inner Bay Area. Improvements to the interchange would relieve congestion and allow for more reliable transit service would result in travel time savings for all users.

STA Ltr. To MTC's ABockelman dated April 10, 2020  
RE: I-80/I-680/SR 12 Interchange Projects Performance Assessment

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Thank you for your consideration for our project. Please contact Robert Guerrero, STA Planning Director, at (707) 399-3211 or [rguerrero@sta.ca.gov](mailto:rguerrero@sta.ca.gov) if you have any questions regarding our letter of commitment.

Sincerely,



Daryl K. Halls  
Executive Director

Cc: STA Board Members

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## North Bay County Transportation Agencies

April 1, 2020

Via Electronic Mail

Page 1 of 3

Ms. Therese McMillan, Executive Director  
**Metropolitan Transportation Commission (MTC)**  
 375 Beale Street, Suite 800  
 San Francisco, CA 94105-2066

**RE: Resilient State Route 37: Plan Bay Area 2050 Letter of Commitment**

Dear Ms. McMillan:

State Route 37 serves as a key regional transportation corridor between the counties of Marin, Sonoma, Napa and Solano due to its strategic role in providing access to all the northern counties of the Bay Area region. In recent years, State Route 37 and its users have suffered from traffic congestion, limited transit options, and vulnerability to sea level rise. Levee breaks and flooding due to harsh seasonal storms have repeatedly resulted in closing portions of the highway.

To address these issues in the near term, and to plan for longer term improvements, the Metropolitan Transportation Commission/Bay Area Toll Authority has been leading the effort, in partnership with Caltrans and the four North Bay County Transportation Agencies (CTAs), to advance and deliver the Resilient State Route 37 Program. The Program will deliver a suite of multi-modal and multi-benefit flood protection, congestion relief and redesigned highway improvements to the corridor – with a laser focus to integrate transportation, ecology, and sea level rise adaptation into the design solutions. Redesign of SR 37 will provide extraordinary wetlands restoration opportunities in the San Pablo Bay. As the region plans for transportation improvements in Plan Bay Area 2050, all six agencies and the SR 37 Policy Committee are vested in making much-needed improvements to meet the needs of the facility's users – especially workers who endure 100 minute, long-distance commutes every day due to jobs and housing imbalance.

As part of Plan Bay Area 2050, MTC conducted a project performance assessment of the Resilient SR 37 Program. The Program received positive benefit/cost ratios across all three futures in the project performance assessment, and in particular, received high benefit/cost ratios under both the Rising Tides Falling Fortunes and the Clean and Green futures, which demonstrated that this project supports the goals of the region. However, given that the project performance assessment identified equity as a challenge for the project, MTC is asking the CTAs to commit to exploring specific actions that could improve the project performance results for Plan Bay Area 2050.

In response to the project performance results, the North Bay CTAs are committed to improvements in State Route 37 and to explore the following strategies to support State Route 37 in meeting Plan Bay Area 2050 goals:

1. **Equity:** the North Bay CTAs are supportive of exploring consistent regional means-based discounts for fares and tolls as part of any future tolling conversations. Specifically, a bill introduced in February 2020 by Senator Bill Dodd to authorize tolling on State Route 37 specifically calls for the tolling authority to develop and implement an equity program to reduce the impact of a toll on low-income drivers.

2. **Affordability:** we collectively support the region’s planning around reforming regional transit fare policies and providing transit alternatives on tolled facilities. Specifically, the project will seek to incorporate alternate travel modes such as express bus service and micro-transit service across the corridor, which is not available currently, including amenities such as park and ride lots. The project also provides high occupancy vehicle (HOV) lanes to encourage carpooling, HOVs would also receive a toll discount, similar to other tolled bridges.
3. **Healthy:** to address a potential increase in vehicle miles of travel and greenhouse gas emissions, the North Bay CTAs would like to clarify that reconstruction of SR 37 will maintain the existing roadway classification as a conventional highway, and not to upgrade to a freeway facility; this will limit the roadway capacity and potential increase in vehicle demand. In addition, the proposed tolling and pricing strategy on this corridor provides an effective tool to manage vehicle traffic demand. The project also will provide a multi-use path and public access improvements, supporting the region’s commitment to complete streets and access for all users. A redesigned and reconstructed SR 37 would provide significant safety improvements on this corridor. And overall the North Bay CTAs will continue to support the maintenance of urban growth boundaries and protecting high value conservation lands.

The North Bay CTAs are committed to work closely with MTC and Caltrans in the development of a funding plan for the project. Specifically:

- The SR 37 Policy Committee supports the concept of implementing tolling on SR 37, which would generate approximately \$600 million in capital funds for Resilient SR 37;
- The North Bay CTAs will collectively contribute up to \$50 million of their county-shares of the Regional Transportation Plan County Budgets towards this project;
- Regional Measure 3 has earmarked \$100 million towards this project, while the BATA has committed \$20 million;
- Caltrans will continue to direct funding for eligible projects from their State Highway Operation and Protection Program (SHOPP) to improve this corridor. Approximately \$77 million is being programmed in Year 2020 cycle. In addition, up to approximately \$854 million is eligible under SHOPP 201.999, “Sustainability and Climate Change.”
- On March 5, 2020, the SR 37 Policy Committee took action to formalize a funding request on the potential future mega-measure FASTER Bay Area should it pass, for \$3.3 billion, of which \$600 million would be made available in the initial ten years. While the FASTER proponents have decided not to place a measure on the November 2020 ballot, it may reappear during the life of the project and the PBA timeframe.
- Other potential fund sources may include future Senate Bill 1 Solutions for Congested Corridors Program, regional discretionary funds, potential future county sales taxes, and Flood Mitigation Assistance Grant Program from the Federal Emergency Management Agency (FEMA). Since the project would provide substantial benefits in facilitating wetland restoration, we would also seek for funding sources such as Measure AA and other federal and state wetlands restoration grants.

The North Bay CTAs respectfully recommend that the Commission include Resilient SR 37 Program as part of Plan Bay Area 2050’s Final Blueprint. This will enable the project team to continue to

advance and deliver highway, restoration and multimodal improvements. We look forward to our continued partnership in addressing the needs of this corridor and our communities.

Sincerely,

DocuSigned by:

*Anne Richman*

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Anne Richman, Executive Director  
Transportation Authority of Marin (TAM)

DocuSigned by:

*Daryl Halls*

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Daryl Halls, CTA Chair/Executive Director  
Solano Transportation Authority (STA)

DocuSigned by:

*Kate Miller*

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Kate Miller, Executive Director  
Napa County Transportation Authority  
(NVTA)

DocuSigned by:

*Suzanne Smith*

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Suzanne Smith, Executive Director  
Sonoma County Transportation Authority  
(SCTA)

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August 1, 2020

Therese W. McMillan  
Executive Director  
Metropolitan Transportation Commission  
375 Beale Street Suite 700  
San Francisco, CA 94105

RE: Bay Area Express Lanes Project Performance in Plan Bay Area 2050

Dear Ms. McMillan:

This letter is in response to the Plan Bay Area 2050 Project Performance Assessment (PPA) findings for the Regional Express Lanes Network. The PPA indicated a few performance shortcomings for the Regional Express Lanes Network, including underperforming benefit-cost ratios, equity and GHG scores. We are writing to convey the regional plan to address these underperformance issues.

For the last year, a working group consisting of Bay Area Express Lanes partners has met to develop an Express Lanes Strategic Plan. This group is collaborating to shape the future of the Express Lanes Network, consistent with the vision and goals of Plan Bay Area 2050. We believe it shows promising benefits if integrated cost-effectively with transit, affordability, and other Plan Bay Area programs. The working group recently developed network scenarios that integrate Plan Bay Area goals and presented them to the MTC Operations Committee in May for Commissioner feedback. Having implemented the recommended changes and presented to the MTC Operations Committee in June, the working group will soon submit a revised Regional Express Lane Network for inclusion into Plan Bay Area 2050.

This letter demonstrates the working group's commitment to improving the network's cost effectiveness, equity and GHG reduction performance while meeting Federal and State operational requirements by: prioritizing segments that support transit/carpooling and provide seamless travel, incorporating projects that utilize conversion of existing right of way over expansion where possible, committing to a means-based toll discount pilot, and implementing public engagement best practices. In addition to revising the Network for Plan Bay Area 2050, the group plans to develop a series of white papers over the summer of 2020 to inform policies and future project development. The outcomes of these white papers along with the revised Regional Express Lanes Network will be documented in a final Regional Express Lanes Strategic Plan at the end of 2020. Some highlights of work to date and upcoming work include:

**Increasing Benefits; Decreasing Costs**

The working group is revising the Regional Express Lanes Network to reflect:

- Segments that can more realistically be built in the next 15 years as well as the next 30 years based on available funds, including local funding commitments to project development and construction, and financing. For example, the costly 580/680 and 680/80 direct connectors most likely will not fit within the funding envelope for this period.
- Segments that support existing and potential future public transit services that advance the equity and GHG goals outlined in the Strategic Plan.

- Prioritization of HOV lane and general-purpose lane conversions (pending changes in legislation and traffic impact analysis) over construction of new lanes to reduce per-mile capital cost and the risk of induced demand/GHG. For example, Ala-580, SF-101/280, SCL 680/280 and SM-101 will evaluate take-a-lane and/or shoulder lane strategies as potential alternatives during the environmental process to evaluate impacts on GHG emissions and operations. Where new lanes are added, it may be possible to use paved right of way to reduce costs.

#### **Local Funding**

Express lanes bring considerable resources to the table to fund their construction, operations and maintenance. This sets them apart from other transportation management strategies.

- The express lanes operating and maintenance costs are covered by express lanes toll revenue and require no regional funds to keep the express lanes in a state of good repair.
- There is \$300 million in capital funding set aside for the express lanes network in Regional Measure 3. MTC is proposing a framework for local RM3 express lane funding to leverage state and federal funding to the greatest extent possible.
- The county transportation agencies plan to leverage over \$80 million in local funds to build the Regional Express Lanes Network.
- Express lane toll revenue can be used to finance the buildout of the network. The financial analysis used in Plan Bay Area 2040 demonstrated the ability to finance up to 60% of the total capital cost. In addition, several projects already in operation and under construction have financed a share of their capital costs with future toll revenue.

#### **Green House Gas**

To decrease GHG emissions, the working group is focusing on projects and programs that increase mode shift and average vehicle occupancy, including:

- Focusing on early delivery of projects with a high potential for express bus ridership and identifying policies that support future express bus service.
- Exploring the use of express lane revenues to support investments in express buses, mobility hubs and other investments to increase bus ridership and carpooling.
- Prioritizing projects that convert existing travel lanes (general-purpose and HOV lanes) to mitigate induced vehicles miles traveled and achieve GHG reduction goals. A white paper will be developed that looks in more detail on the impacts of interregional express lanes segments and dual express lane segments on VMT/GHG.

#### **Equity**

The working group recognizes that equity is a key objective for the Express Lanes Network and is supportive of means-based tolling as one of various strategies in Plan Bay Area 2050 that could address equity. In the near-term, the working group supports a BAIFA-led pilot of means-based tolling on BAIFA's express lanes. At the same time, San Mateo and SFCTA are undertaking studies to better understand and advance equity. These studies may result in additional pilots that complement BAIFA's pilot.

**Plan Bay Area Concepts**

In addition, the express lane partner agencies support high-performing policies and projects in the Plan Bay Area 2050 Draft Blueprint:

- Eventual transition to congestion pricing on all freeway lanes in corridors with robust transit options. Express lanes can be a stepping stone to more extensive congestion pricing strategies. Prior to such implementation, further investigation is needed to better understand how congestion pricing on freeways may be implemented and the potential impacts on express lane operations as well as local roadways and transit.
- Lowering the speed limit to 55 miles per hour on freeways to improve safety. During congested periods the general-purpose lanes typically flow well below that speed, and so the express lanes could still offer a travel time and reliability advantage.
- Expansion of local bus services and non-motorized modes that serve shorter trips of all types and thus complement express lanes and express bus service, which tend to serve longer, largely commute trips.
- Integrated transit fares and payment platforms, which can help implement affordability policies and provide incentives for using transit, ridesharing and first and last mile services.

As a region, we are committed to implementing an Express Lane Network that serves the community and the surrounding environment equitably, cost-effectively and sustainably in order to advance the goals of Plan Bay Area 2050. We look forward to hearing your thoughts and discussing this further. If you have any questions about this format, please contact Jim Macrae at [jmacrae@bayareametro.gov](mailto:jmacrae@bayareametro.gov).

Sincerely,

ALAMEDA COUNTY TRANSPORTATION  
COMMISSION

BAY AREA INFRASTRUCTURE FINANCE AUTHORITY

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Tess Lengyel, Executive Director

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Andrew B. Fremier, Deputy Executive Director,  
Operations

Date: \_\_\_\_\_

Date: \_\_\_\_\_

SAN FRANCISCO COUNTY TRANSPORTATION  
AUTHORITY

SAN MATEO CITY/COUNTY ASSOCIATION OF  
GOVERNMENTS (C/CAG)

\_\_\_\_\_  
Tilly Chang, Executive Director

\_\_\_\_\_  
Sandy Wong, Executive Director

\_\_\_\_\_  
Date:

\_\_\_\_\_  
Date:

SAN MATEO COUNTY TRANSPORTATION  
AUTHORITY

SAN MATEO COUNTY EXPRESS LANES JOINT  
POWERS AUTHORITY (SMCEL-JPA)

\_\_\_\_\_  
Jim Hartnett, Executive Director

\_\_\_\_\_  
Jim Hartnett, Executive Council

\_\_\_\_\_  
Date:

\_\_\_\_\_  
Date:

SAN MATEO COUNTY EXPRESS LANES JOINT  
POWERS AUTHORITY (SMCEL-JPA)

SANTA CLARA VALLEY TRANSPORTATION  
AUTHORITY (VTA)

\_\_\_\_\_  
Sandy Wong, Executive Council

\_\_\_\_\_  
Deborah Dagang, Director of Planning and  
Programming

\_\_\_\_\_  
Date:

\_\_\_\_\_  
Date:

**Metropolitan Transportation Commission  
and Association of Bay Area Governments**

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