PLAN BAY AREA 2050

TECHNICAL ASSUMPTIONS REPORT

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ASSOCIATION
OF BAY AREA
GOVERNMENTS

METROPOLITAN
TRANSPORTATION
COMMISSION

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Executive Summary

Plan Bay Area 2050 represents a $1.4 trillion vision for the Bay Area's future, outlining strategies across the interrelated elements of transportation, housing, the environment and the economy for the period 2021 through 2050. Undergirding these strategy proposals is a suite of technical analyses to estimate the revenues available to invest in these areas and the costs of the proposed strategies. These financial analyses support the future implementation of Plan Bay Area 2050, providing a funding envelope within which strategies should be prioritized.

While MTC has a long history of forecasting transportation needs and revenues in the long-range planning context, Plan Bay Area 2050 represents the first time MTC and ABAG have applied these approaches to the areas of housing, the environment and the economy. As such, needs and revenue assessments for these three elements remain higher-level, but they represent a first step in making Plan Bay Area 2050 a more comprehensive plan.

Transportation Element

The transportation element of Plan Bay Area 2050 is comprised of 12 strategies totaling $578 billion that chart the course for the future of the region's roads, highways, bridges, transit and active transportation infrastructure. Just under three-fourths of all transportation funds are dedicated toward maintaining and optimizing the existing system. This includes more than $300 billion to operate and maintain the existing system of highways, local streets and roads, bridges and transit (Table 1).

Table 1. Summary of Plan Bay Area 2050 operations and maintenance needs (in billions of year-of-expenditure (YOE)$)

ASSET CATEGORY	PLAN BAY AREA 2050 INVESTMENT (BILLIONS)
Transit Operations	$211
Transit Capital Maintenance	$60
Local Streets and Roads	$62
State Highways	$24
Regional Bridges	$22
Local Bridges	$3
Total	**$381**

On top of this investment, the plan invests billions in optimizing the existing system, creating healthy and safe streets, and building a 21st century transit system. The investments outlined in the plan leverage multiple rounds of analysis to assign funding to transportation projects submitted for consideration for inclusion in the transportation project list by transit operators, county transportation agencies (CTAs), the MTC Operations division and members of the public. Projects that were shown to be cost-effective and to advance equity across varying future conditions were prioritized for inclusion.

Table 2. Transportation element summary (in billions of YOE$)

THEME	STRATEGY	COST
Maintain and optimize the existing system	Restore, operate and maintain the existing system	$389
	Support community-led transportation enhancements in Equity Priority Communities	$8
	Enable a seamless mobility experience	$3
	Reform regional transit fare policy	$10
	Implement per-mile tolling on congested freeways with transit alternatives	$1
	Improve interchanges and address highway bottlenecks	$12
	Advance other regional programs and local priorities	$17
Create healthy and safe streets	Build a Complete Streets network	$13
	Advance regional Vision Zero policy through street design and reduced speeds	$4
Build a next-generation transit network	Enhance local transit frequency, capacity and reliability	$32
	Expand and modernize the regional rail network	$81
	Build an integrated regional express lanes and express bus network	$9

Plan Bay Area 2050's transportation element is fiscally-constrained, meaning that funding allocations do not exceed the projected total funding available. Revenue analysis, based on funding received by the region in prior years and assumptions on future years' funding documented within this report, suggests the region can expect to receive $469 billion in transportation-related revenues between 2021 and 2050. This includes funding from federal, state, regional and local sources. Other reasonably-anticipated revenues, including those generated from plan strategies and from a future regional transportation "mega measure" supported by independent polling, augment the historic revenue assumptions by $110 billion.

Environment Element

The environment element of Plan Bay Area 2050 is comprised of nine strategies totaling $103 billion for investment in the region's parks, open space, clean transportation alternatives, and resilience to natural hazards like sea level rise and earthquakes. While some strategies are virtually no-cost policy interventions, the plan envisions substantial public investment in residential and public buildings, parks, trails, electric vehicle incentives and more.

Table 3. Environment element summary (in billions of YOE$)

THEME	STRATEGY	COST
Reduce risks from hazards	Adapt to sea level rise	$19
	Provide means-based financial support to retrofit existing residential buildings	$15
	Fund energy upgrades to enable carbon neutrality in all existing commercial and public buildings	$18
Expand access to parks and open space	Maintain urban growth boundaries	N/A
	Protect and manage high-value conservation lands	$15
	Modernize and expand parks, trails and recreation facilities	$30
Reduce climate emissions	Expand commute reduction programs at major employers	N/A
	Expand clean vehicle initiatives	$5
	Expand transportation demand management initiatives	$1

If historic funding paradigms were to continue, the Bay Area could expect to have $16 billion to implement environmental strategies, including revenues for sea level rise, earthquake mitigations and existing transportation revenues for climate strategies. This excludes an assessment of funding available for investment in parks and open space, as that information was not readily available. New revenues totaling $87 billion would be needed to realize the full suite of strategies included in the plan.

Housing Element

The housing element of Plan Bay Area 2050 is comprised of nine strategies totaling $468 billion that invest in housing affordability across all income levels and forge more inclusive communities. The bulk of these revenues are dedicated to affordable housing preservation and production, with some funding envisioned for mortgage assistance to promote homeownership for families with low or moderate incomes.

Table 4. Housing element summary (in billions of YOE$)

THEME	STRATEGY	COST
Protect and preserve affordable housing	Further strengthen renter protections beyond state law	$2
	Preserve existing affordable housing	$237
Spur housing production for residents of all income levels	Allow a greater mix of housing densities and types in Growth Geographies	N/A
	Build adequate affordable housing to ensure homes for all	$219
	Integrate affordable housing into all major housing projects	N/A
	Transform aging malls and office parks into neighborhoods	N/A
Create inclusive communities	Provide targeted mortgage, rental and small business assistance to Equity Priority Communities	$10
	Accelerate reuse of public and community-owned land for mixed-income housing and essential services	N/A

The Bay Area presently receives revenues to support housing strategies, particularly for the production and maintenance of affordable housing. If today's funding levels were to continue over the next three decades, the region would expect to receive $122 billion in funding for housing. An additional $346 billion in new revenues, which could be generated in part through the work of the Bay Area Housing Finance Authority (BAHFA), would support the full realization of the Plan Bay Area 2050 housing strategies.

Economy Element

The economy element of Plan Bay Area 2050 is comprised of six strategies totaling $234 billion that seek to improve economic mobility and shift the location of jobs toward a greater jobs/housing balance. Some strategies are policies with no associated cost, while others are investments in infrastructure or social programs.Table 5. Economy element summary (in billions of YOE$)

Table 5. Economy element summary (in billions of YOE$)

THEME	STRATEGY	COST
Improve economic mobility	Implement a statewide universal basic income	$205
	Expand job training and incubator programs	$5
	Invest in high-speed internet in underserved low-income communities	$10
Shift the location of jobs	Allow greater commercial densities in Growth Geographies	N/A
	Provide incentives to employers to shift jobs to housing-rich areas well served by transit	$10
	Retain and invest in key industrial lands	$4

Strategies in the economy element are assumed to be supported entirely by new revenues. While some revenues for economic development do exist, information on these revenue sources or their uses is limited, making a full financial analysis out of reach for Plan Bay Area 2050.

Technical Assumptions Regarding Post-COVID-19 Conditions

The COVID-19 pandemic introduced enormous uncertainty into the present and future financial situation of public agencies throughout the world. Plan Bay Area 2050 has sought to be responsive to the rapidly shifting financial landscape, while also centering itself as a big-picture long-range planning document, as opposed to a short-range programming plan.

The plan is supported by several phases of financial analysis. The initial needs and revenue projections for Plan Bay Area 2050 were released in December 2019, months before the onset of the COVID-19 pandemic and the ensuing economic fallout. The needs and revenues for transportation were updated in May 2020 to reflect the reduction in funding for transportation, using the best information available at that time. The needs estimates for operating and maintaining the existing system were lowered in the short-term, reflecting lower usage of transit and roads and reduced operating revenues. The overall revenue estimate was reduced by $11 billion, reflecting an anticipated decrease in revenues from local, regional and state sources.

Since April 2020, the region has received over $3 billion in federal emergency funds for transit from the Coronavirus Aid, Relief, and Economic Security (CARES) Act, the Coronavirus Response and Relief Supplemental Appropriations Act, 2021 (CRRSAA) and the American Rescue Plan (ARP) of 2021, which is reflected in the summary of the financial analysis for transportation.

Funding impacts from COVID-19 were also considered for the housing, economy and environment elements, though the needs and revenues projections were not revised due to the sketch-level nature of these analyses. Over the course of 2020 and 2021, the federal government provided additional revenues in these areas, particularly in the housing and economic spheres, through various relief measures. These new revenues were designed to fill funding gaps and support near-term recovery needs. A qualitative discussion of the potential impacts of the pandemic and its economic reverberations is included in the report for each element.

Chapter 1 | Introduction

Plan Bay Area 2050 represents a $1.4 trillion vision for the Bay Area's future, outlining strategies across the interrelated elements of transportation, housing, the environment and the economy for the period 2021 through 2050. Undergirding these strategy proposals is a suite of technical analyses to develop the estimated revenues available to invest in these areas, and to estimate the costs of the proposed strategies. This report focuses on describing the costs of strategies that would entail substantial capital and/or operating costs to implement. Cost information is not provided for strategies that would require only an incremental increase in administrative costs to implement. The 35 strategies adopted by the Commission and ABAG Executive Board for inclusion in Plan Bay Area 2050 are summarized in detail in the briefs included as Appendix 1 of this report.

As Plan Bay Area 2050 is designed to meet all of the requirements of a Regional Transportation Plan and Sustainable Communities Strategy, there are several additional requirements placed on the transportation element. Chiefly, the transportation strategies and investments are required to be fiscally constrained. This report details the estimated revenues for transportation from federal, state, regional and local sources, as well as new revenues generated through publicly-supported tax increases and revenue-generating strategies within the plan. These assumptions have been updated to reflect the fallout of the COVID-19 pandemic on funding and transit service levels.

Plan Bay Area 2050 is the first long-range plan to include separate elements for housing, the environment and the economy, matching anticipated revenues with strategy costs. As this plan represents the first foray into these areas, and because the same standards for fiscal constraint do not apply, documentation of needs and revenues for the housing, environment and economy elements is more high-level. MTC and ABAG will continue to enhance methodologies and approaches to financial analysis for these areas in the coming years.

NOTE: Throughout this document, needs and revenue numbers are presented in a rounded format. As such, numbers in tables may not always sum.

Chapter 2 | Technical Assumptions for the Transportation Element

Introduction

The transportation element of Plan Bay Area 2050 is comprised of a fiscally-constrained suite of transportation strategies — policies and investments – that help the region meet its state-mandated greenhouse gas emissions reduction target, while also advancing equity and meeting the needs of a growing population.

A number of factors informed the creation of the transportation element. One key element is the transportation revenue forecast, which identifies the revenues the region can reasonably expect to receive over the plan's horizon spanning from FY 2020-21 through FY2049-50. This reflects funds from federal, state, county and local sources, as well as new revenues that are generated by projects within the transportation element and other new revenue streams supported by public polling. The investments themselves were sourced from members of the public and partner agencies through multiple rounds of engagement. Analytical tools were used to assess the impacts of large individual projects and packages of projects and policies. Members of the public and partner agencies voiced their priorities, further informing the full package of strategies.

Transportation Revenue Forecast

Funds to implement Plan Bay Area 2050's transportation element come from federal, state, regional and local sources. Many transportation funding sources and programs have specific purposes and eligibility restrictions, while others have greater degrees of flexibility. The following section details the fund sources and their respective funding programs of Plan Bay Area 2050's transportation revenue projections. The revenues detailed in the following section are presented in Table 7. The 30-year period covered by the transportation revenue forecast begins in Fiscal Year (FY) 2020-21 and extends through FY 2049-50.

Projected transportation revenues in Plan Bay Area 2050 reflect fiscal constraint as required by 23 CFR Part 450.324. Forecasted revenues are presented in nominal, or "year-of-expenditure," dollars and consist of all revenues that are "reasonably expected to be available" within the plan period. The Plan assumes a 2.2% inflation rate, the same rate used in Plan Bay Area 2040. This rate is consistent with inflation forecasts for the Bay Area from the California Department of Finance, the U.S. Federal Reserve, and the federal Office of Management and Budget (OMB).

For improved planning, transparency, and fiscal constraint, the Plan Bay Area 2050 transportation revenue forecast has been segmented into "bins", based on the period of when revenues are anticipated to be available. The first two bins (FY 2021 - FY 2035 and FY 2036 - FY 2050) correspond to the years of the plan that funds are expected to be available. The third bin is comprised of fund sources that are not received on an annual or formulaic basis (e.g., federal New Starts/Small Starts funds or state Transit and Intercity Rail Capital Program funds). These funds can be applied to expenditures throughout the 30-year time period of Plan Bay Area 2050.

The onset of the COVID-19 pandemic in early 2020, after the Plan Bay Area 2050 transportation revenue forecast had initially been developed, necessitated revisions to the revenue assumptions. A revised revenue forecast was shared with the MTC Planning and ABAG Administrative Committees and various working groups starting in May 2020, reflecting the final transportation needs and revenue assumptions used for the development of Plan Bay Area 2050. Given the unprecedented level of uncertainty regarding the economic impacts of the pandemic, staff incorporated an approach to reduce transportation revenues from fund sources across the first 15 years of Plan Bay Area 2050, resulting in an $11 billion reduction in revenues available for transportation expenditures. This forecast was based on a fund source by fund source forecast of pandemic-induced impacts based on data from the first three months of the pandemic. By FY 2036, the plan assumes that revenues will return to the levels that were assumed had the pandemic

not occurred, consistent with the trends for population and jobs growth included in the Plan Bay Area 2050 Regional Growth Forecast. This conservative approach in the first "bin" of Plan Bay Area 2050 revenues acknowledges the unknown long-term impacts of the pandemic on transportation funding, and increases the likelihood that revenue identified in the first bin will be available in the near to medium term.

Federal Funding

Federal fund sources included in the transportation revenue forecast are assumed to increase at a 2% annual growth rate for the period from FY 2020-21 to FY 2029-30, and at a 3% annual growth rate for the remainder of the plan. These growth rates are applied to a base year of the actual federal funds received in the region in FY 2018-19.

Federal transportation revenues are generated through a federal fuel excise tax (18.4 cents per gallon of gasoline and 24.4 cents per gallon of diesel fuel). The generated revenues are deposited into the Highway Trust Fund (HTF). Generally, about 85% of the HTF revenues are directed to the Highway Account and the remaining 15% of the HTF revenues are directed to the Transit Account.

New Starts, Small Starts and Core Capacity

The transportation revenue forecast includes a total of $11.2 billion for Federal Transit Administration (FTA) Section 5309 Fixed-Guideway Capital Investment Grants, usually referred to as the New Starts and Small Starts programs. The revenue forecast for the New/Small Starts program is based upon an analysis of the funding the Bay Area has received from these programs over the last 10 years, which amounts to an average of nearly 10% of the overall national program. This represents an increase to the Bay Area share of the national program from the 7.6% that was assumed in Plan Bay Area 2040. MTC expects the Bay Area over the plan period will perform well with Core Capacity-type projects, given the age of fixed-guideway in our transit systems.

The $11.2 billion forecast includes approximately $270 million in committed New Starts funding for Caltrain electrification. The remaining $10.9 billion represents available discretionary funding in the plan.

Fixing American's Surface Transportation (FAST) Act

Federal funding in the plan assumes the framework and funding levels contained in the 2015 Fixing America's Surface Transportation (FAST) Act, which established federal funding levels through September 30, 2020. The FAST Act established two new programs related to goods movement: the National Highway Freight Program and the National Significant Freight and Highway Projects Discretionary Program. Plan Bay Area 2050 assumes the federal programs in place under the FAST Act continue for the duration of the plan period.

Federal Highway Administration (FHWA) Funding

The federal highway program is assumed to continue in its current form. In addition to the new goods movement programs authorized by the FAST Act, Surface Transportation Block Grant Program (STBG), Congestion Mitigation and Air Quality Improvement (CMAQ) Program and Highway Bridge funds are assumed to grow at a rate of 2% annually from FY 2020-21 to FY 2029-30, and at 3% for the remainder of the plan. Base year revenue is set at the amount of federal funds actually received in the Bay Area in FY 2018-19, and the plan projects the Bay Area will continue to receive its historically proportionate share of these programs.

Federal Transit Administration (FTA) Funding

Federal Transit Administration programs — Sections 5307, 5309, 5310, 5311, 5337, 5339 and 5340 — are based on the FAST Act nationally authorized levels and are assumed to grow at a rate of 2% annually from FY 2020-21 to FY 2029-30, and at 3% for the remainder of the plan (except for Section 5309 which is assumed to be flat as authorized in the FAST Act). The Bay Area is assumed to receive its historical proportionate share for formula programs and is assumed to receive an average of nearly 8% of Section 5309 funds available nationally.

Coronavirus Aid, Relief, and Economic Security (CARES) Act Funding

The Bay Area received nearly $1.3 billion in supplemental Federal Transit Administration (FTA) Urbanized Area Formula (Section 5307) and Rural Area Formula (Section 5311) program funds to support transit agency operations impacted by COVID-19 through the CARES Act (signed on March 27, 2020). The funding was distributed in two phases, totaling $781 million and $507 million, respectively, to allow for the provision of immediate relief as well as to preserve flexibility to more accurately match and reconcile revenue losses.

Coronavirus Response and Relief Supplemental Appropriations Act, 2021 (CRRSAA) Funding

The Bay Area received $982 million in supplemental Federal Transit Administration (FTA) Urbanized Area Formula (Section 5307) and Rural Area Formula (Section 5311) program funds to support transit agency operations impacted by COVID-19 through the Coronavirus Response and Relief Supplemental Appropriations Act, 2021 (CRRSAA). The funding was distributed in two phases, totaling $180 million and $802 million, respectively.

American Rescue Plan (ARP) Act of 2021 Funding

The Bay Area received nearly $1.7 billion in supplemental Federal Transit Administration (FTA) Urbanized Area Formula (Section 5307) and Rural Area Formula (Section 5311) program funds to support transit agency operations impacted by COVID-19 through the American Rescue Plan Act. These funds are expected to be allocated starting in July 2021.

State Funding

The majority of state funds for transportation are based on various motor vehicle fuel taxes. Assumptions underlying the prices and level of consumption for motor vehicle fuel used in the financial projections strive to be consistent with the driving cost assumptions used by MTC's travel model. The California Air Resources Board (CARB) developed a tool for regions to estimate the per-mile cost of driving using energy demand and fuel price forecasts published by the California Energy Commission (CEC).

Senate Bill 1 Revenue Programs

In 2017, the California Legislature passed Senate Bill 1, containing $54 billion of new fund sources and programs for transportation over 10 years. This represents the largest investment in transportation in California in decades, doubling STA funds and establishing a State of Good Repair program for transit. Fund sources that inform the Senate Bill 1 program revenue forecast include fuel sales and excise taxes, a license fee-based transportation improvement fee, and an electric vehicle fee. The distribution of program funding is contained in statute and where the state has discretion over the funding shares of competitive programs, staff has assumed Bay Area shares based on past and predicted performance.

State Transportation Improvement Program (STIP)

The STIP consists of two main parts, the Regional Transportation Improvement Program (RTIP) and the Interregional Transportation Improvement Program (ITIP). The RTIP is the 75% regional share of the capital improvement program that includes projects on and off the state highway system. The ITIP is the 25% interregional share that focuses on projects in the state that cross metropolitan boundaries or are generally more regional in scope. STIP revenue comes primarily from the supplemental 17.3-cent excise tax on gasoline. Prior to the passage of Senate Bill 1, the amount of this supplemental excise tax was variable, and would be adjusted annually based on the price of gasoline. Senate Bill 1 "reset" the excise tax in 2019 to 17.3 cents, to be annually indexed to inflation beginning in 2020.

High-Speed Rail

Work is already underway on the Central Valley segment of the California High-Speed Rail project. The Bay Area is poised to receive just over $1.5 billion in revenues for connectivity projects already planned or under construction, plus a small amount of state funding for future connectivity projects.

Regional Funding

Regional transportation revenues are generated through several sources, including general sales and use taxes, bridge tolls, and express lanes on highways.

Assembly Bill 1107 (AB 1107)

Revenues from AB 1107 (1977), the half-cent sales tax for the three BART counties of Alameda, Contra Costa and San Francisco, are distributed 75% to BART, and 25% to MTC. Revenues are assumed to grow at a rate derived by taking a weighted average of sales tax growth rates estimated by the sales tax authorities in each of the three counties.

Bridge Tolls

Bridge toll revenues are based on projected travel demand on the region's seven state-owned toll bridges. Toll-paid travel on the bridges is projected to grow at varied annual rates of between 0.3% and 0.5% over the 30-year period. The Regional Measure 3 bridge toll, approved by voters in 2018 and currently under legal challenge, is assumed to be available to support projects over the Plan Bay Area 2050 period. The transportation revenue forecast also assumes the two remaining $1 toll increases specified by Regional Measure 3 will be implemented in 2022 and 2025.

Regional Express Lanes

Regional Express Lane Network revenues included in the financially constrained plan represent projected gross toll revenue for express lanes in Solano, Contra Costa and Alameda counties, which will be operated by MTC and the Alameda County Transportation Commission. Over the course of the plan period, these revenues will be wholly dedicated to meet the operations, maintenance, rehabilitation, and capital financing of the network. Toll revenues from express lanes in Santa Clara County, which are considered committed, are included in the Local Revenues section of the Plan Bay Area 2050 Transportation Revenue Forecast.

Local Funding

The major local fund sources in the plan include transit fare revenues, street and road local revenues, and sales tax-based revenues.

Sales Taxes

The revenue forecast includes funds generated by county transportation sales taxes, transit district sales taxes, and the Transportation Development Act's (TDA) Local Transportation Fund ¼-cent sales tax, which is collected in each Bay Area county. The forecast also includes revenues expected from the reauthorization of county and transit district sales taxes which are set to expire during the plan period. Forecasts for county transportation sales taxes and transit district sales taxes are developed directly by the sales tax administrating agencies. Estimates for county sales tax and transit district measures were submitted by each county sales tax agency. These estimates are used in the revenue forecast to maintain consistency with sales tax expenditure and strategic plans. To maintain consistency, TDA growth rates assume the same growth rates as those provided by the sales tax authorities in their respective counties. The sales tax forecast for Solano County is based on a 10-year historical analysis of actual TDA receipts. The AB1107 forecast is a weighted average of projected growth rates for Alameda, Contra Costa and San Francisco counties.

Table 6. Projected sales tax growth rates

COUNTY	AVERAGE SALES TAX GROWTH RATE
Alameda	2.0%
Contra Costa	4.3% (renewal of county measure at 3.7%)
Marin	2.5%
Napa	2.5%
San Francisco	3.5%
San Mateo	2.0%
Santa Clara	3.0%
Solano*	2.2%
Sonoma	3% (renewal of county measure at 2%)
SMART	2.5%
AB 1107**	2.9%

*Sales tax forecast for Solano County is based on a 10-year retrospective analysis of actual TDA receipts.

**AB 1107 forecast is the weighted average of projected growth rates for Alameda, Contra Costa, and San Francisco counties.

Local Streets and Roads Funds

Local streets and roads revenue includes funds made available from local sources (not including county transportation sales tax measures) such as local general funds and developer/impact fees. Local revenue estimates are based on information provided to MTC by local agencies in response to the 2018 California Statewide Local Streets and Roads Needs Assessment.

Anticipated/Unspecified Funding

Anticipated revenue represents funding that is likely to become available from federal or state sources over the course of the plan period but is unspecified in terms of source or expenditure requirements. Reasonably anticipated revenues differ from new, specific revenue that would be generated under local or regional control such as sales tax reauthorizations or regional bridge toll increases. Examples of this revenue would be the American Recovery and Reinvestment Act (ARRA) transportation funding that was distributed by the federal government in FY 2009 in response to the national recession, as well the Senate Bill 1 transportation revenue that became available in 2017 but was not incorporated in the revenue forecast for Plan Bay Area 2040. The revenue forecast includes $20.8 billion in anticipated revenues. This estimate is based upon an analysis of revenue sources that materialized over a 15-year period from FY 2005-06 through FY 2019-20.

New Revenues for Transportation

Voter-Approved Revenues ("Mega Measure")

This category includes revenues associated with a regional "mega measure" transportation funding proposal, akin to the proposal that was under discussion in the Bay Area prior to the COVID-19 pandemic and ensuing economic recession. The revenue generation forecast for the mega measure was based on a 1% sales tax in all nine Bay Area counties passing in 2030, with revenue generation beginning in earnest in FY 2032-33. Although the forecast was based on a 1% sales tax, the revenue is not intended to be tied to a specific proposed fund source or mechanism. An independently conducted 2019 poll of Bay Area residents registered over two-thirds public support for such a measure, on par with what would be required to pass the measure. A report summarizing this polling is included as Appendix 2 to this report.

Revenues Generated by Plan Strategies

The Plan Bay Area 2050 transportation revenue forecast also includes new revenues generated from strategies and associated projects that would not exist in a No Project scenario. This includes fees from an envisioned per-mile toll on highway driving, increased parking fees, fares from new transit service, and other user fees from projects such as cordon pricing. Where feasible, the revenues associated with these sources are forecasted based on simulated behavior from Travel Model 1.5, which represents how travel behavior would shift with the strategies in place. For more information on how the road pricing and parking fees were implemented in Travel Model 1.5, see the Plan Bay Area 2050 Forecasting and Modeling Report.

Road Pricing Revenue
Plan Bay Area 2050 includes a strategy to institute a per-mile fee on select freeway corridors beginning in either 2030 or 2035, depending on the corridor. The fee is envisioned to range between 5 cents and 15 cents per mile, varying by vehicle occupancy and time of day, with a 50% discount on travel for drivers with incomes under the regional median. The revenue estimated from this strategy on a typical weekday is calculated using the modeled number of vehicle miles traveled on tolled corridors by occupancy, time of day and household income of the driver, incorporating any changes in behavior that would occur with all strategies in place. Year 2035 earnings are expected to remain constant between 2030 and 2050, and are escalated using a 2.2% annual inflation rate. In total, an estimated $25 billion in new revenues resulted from this strategy.

Parking Fee Revenue

The Plan Bay Area 2050 strategy to expand transportation demand management initiatives includes an envisioned increase in parking costs in Plan Bay Area 2050 Growth Geographies, which are areas prioritized for housing and job growth in the plan. Parking fees would range from 25 cents to 50 cents per hour in all Growth Geographies. Revenues on a typical weekday from this strategy in 2035 are calculated using data from Travel Model 1.5, taking into account how behavior would change with the new parking pricing structure in place. These revenues are assumed to remain constant between the 2035 start date and 2050, and are increased using a 2.2% annual inflation rate. In total, an estimated $13 billion in new revenues resulted from this strategy. This estimate does not include any additional parking revenue generated from the removal of employer-provided parking subsidies, as it was assumed that employers would recoup these funds.

Project-Related Revenues

In prior long-range plans, the additional fares generated from planned service increases were subtracted from the cost of the project. In order to increase transparency, Plan Bay Area 2050 represents the full estimated cost of these projects, adding additional fare dollars to the transportation revenue forecast. Transit fares from new service are calculated by multiplying the reported operations and maintenance costs by the observed farebox recovery rate, as reported in MTC's 2017 Transit Statistical Summary. For projects such as Valley Link that would be operated by a new transit provider, a proxy farebox recovery rate was used from a similar service already in operation.

Finally, several road projects included in Plan Bay Area 2050 are expected to generate user fees. These include congestion pricing on Treasure Island and in downtown San Francisco, a toll component of the SR-37 Interim and Full projects, and uncommitted express lanes. Project sponsors provided revenue estimates to MTC, which were added to the transportation revenue forecast.

Transportation Revenue Forecast Summary Table

Table 7. Plan Bay Area 2050 transportation revenue forecast by source (in billions of YOE$)

REVENUE SOURCE	PLAN BAY AREA 2050 REVENUE ASSUMPTIONS	PLAN BAY AREA 2050 TOTAL REVENUE	REVENUE BIN 1 FY 2021 - FY 2035	REVENUE BIN 2 FY 2036 - FY 2050	REVENUE BIN 3 FLEXIBLE AVAILABILITY
Federal					
FHWA Construction of Ferry Boats and Ferry Terminal Facilities Formula Program	Base Year: FY 2018-19 Data Source: FHWA Growth Rate: 2%-3%	$0.1	$0.0	$0.1	$0.0
FHWA/FTA Section 5303 Metropolitan Planning	Base Year: FY 2018-19 Data Source: FHWA Growth Rate: 2%-3%	$0.5	$0.2	$0.3	$0.0
FHWA STBG/CMAQ	Base Year: FY 2018-19 Data Source: FHWA Growth Rate: 2%-3%	$7.7	$3.0	$4.7	$0.0
FHWA Highway Safety Improvement Program (HSIP)	Base Year: FY 2018-19 Data Source: FHWA Growth Rate: 2%-3%	$0.8	$0.3	$0.5	$0.0
FTA Passenger Ferry Grant Program	Base Year: FY 2018-19 Data Source: FTA Growth Rate: 2%-3%	$0.2	$0.1	$0.1	$0.0
FTA Sections 5307 and 5340 Urbanized Area Formula (Capital)	Base Year: FY 2018-19 Data Source: FTA Growth Rate: 2%-3%	$10.5	$4.2	$6.3	$0.0

REVENUE SOURCE	PLAN BAY AREA 2050 REVENUE ASSUMPTIONS	PLAN BAY AREA 2050 TOTAL REVENUE	REVENUE BIN 1 FY 2021 - FY 2035	REVENUE BIN 2 FY 2036 - FY 2050	REVENUE BIN 3 FLEXIBLE AVAILABILITY
FTA Section 5309 Fixed-Guideway Capital Investment Grants - New Starts and Core Capacity	Base Year: FY 2018-19 Data Source: FTA Growth Rate: 2%-3%	$9.2	$0.0	$0.0	$9.2
FTA Section 5309 Fixed-Guideway Capital Investment Grants - Small Starts	Base Year: FY 2018-19 Data Source: FTA Growth Rate: 2%-3%	$2.0	$0.0	$0.0	$2.0
FTA Section 5310 Enhanced Mobility of Seniors and Individuals with Disabilities	Base Year: FY 2018-19 Data Source: FTA Growth Rate: 2%-3%	$0.2	$0.1	$0.1	$0.0
FTA Section 5311 Non-Urbanized Area Formula	Base Year: FY 2018-19 Data Source: FTA Growth Rate: 2%-3%	$0.1	$0.0	$0.0	$0.0
FTA Section 5337 State of Good Repair Formula	Base Year: FY 2018-19 Data Source: FTA Growth Rate: 2%-3%	$10.5	$4.2	$6.3	$0.0
FTA Section 5339 Bus and Bus Facilities Program	Base Year: FY 2018-19 Data Source: FTA Growth Rate: 2%-3%	$0.7	$0.3	$0.4	$0.0
FTA Bus and Bus Facilities Discretionary Program	Base Year: FY 2018-19 Data Source: FTA Growth Rate: 2%-3%	$0.1	$0.1	$0.1	$0.0

REVENUE SOURCE	PLAN BAY AREA 2050 REVENUE ASSUMPTIONS	PLAN BAY AREA 2050 TOTAL REVENUE	REVENUE BIN 1 FY 2021 - FY 2035	REVENUE BIN 2 FY 2036 - FY 2050	REVENUE BIN 3 FLEXIBLE AVAILABILITY
National Highway Freight Program	Base Year: FY 2018-19 Data Source: FHWA Growth Rate: 2%-3%	$1.2	$0.5	$0.7	$0.0
National Significant Freight and Highway Projects Discretionary Program	Base Year: FY 2018-19 Data Source: FHWA Growth Rate: 2%-3%	$2.0	$0.8	$1.2	$0.0
Highway Bridge Program	Assumption: 5-Year Historical Avg. Data Source: FMS Growth Rate: 2%-3%	$1.8	$0.7	$1.1	$0.0
Coronavirus Aid, Relief, and Economic Security (CARES) Act	Data Source: FTA	$0.5	$0.5	$0.0	$0.0
Coronavirus Response and Relief Supplemental Appropriations Act, 2021 (CRRSAA)	Data Source: FTA	$1.0	$1.0	$0.0	$0.0
American Rescue Plan Act of 2021	Data Source: FTA	$1.7	$1.7	$0.0	$0.0
Federal Total		**$50.8**	**$17.7**	**$21.9**	**$11.2**

REVENUE SOURCE	PLAN BAY AREA 2050 REVENUE ASSUMPTIONS	PLAN BAY AREA 2050 TOTAL REVENUE	REVENUE BIN 1 FY 2021 - FY 2035	REVENUE BIN 2 FY 2036 - FY 2050	REVENUE BIN 3 FLEXIBLE AVAILABILITY
Active Transportation Program (ATP) - State Program (Note: Program includes a mix of federal and state funds)	Assumption Base: FY 2017-18 Distribution Base: Bay Area receives 20% of funds	$0.6	$0.3	$0.3	$0.0
Affordable Housing and Sustainable Communities Program	Assumption Base: $2.9 billion per year in Cap and Trade auction proceeds Distribution Base: Bay Area receives 30% of funds	$1.8	$0.9	$0.9	$0.0
Cap and Trade Goods Movement (from 40% Uncommitted Funds)	Assumption Base: $2.9 billion per year in Cap and Trade auction proceeds Distribution Base: Bay Area receives 6.5% of funds	$2.2	$1.1	$1.1	$0.0
Freeway Service Patrol	Assumption Base: Bay Area share of prescribed statewide set-aside from the Road Maintenance and Rehabilitation Account	$0.1	$0.1	$0.1	$0.0
Gas Tax Subvention + RMRA	Assumption Base: Estimate of Fuel excise tax and Road Maintenance and Rehabilitation Account revenue Distribution Base: Bay Area share of registered vehicle, road mileage, and population	$23.7	$9.5	$14.2	$0.0

REVENUE SOURCE	PLAN BAY AREA 2050 REVENUE ASSUMPTIONS	PLAN BAY AREA 2050 TOTAL REVENUE	REVENUE BIN 1 FY 2021 - FY 2035	REVENUE BIN 2 FY 2036 - FY 2050	REVENUE BIN 3 FLEXIBLE AVAILABILITY
High Speed Rail	Assumption Base: Bay Area current + anticipated connectivity projects.	$1.6	$0.0	$0.0	$1.6
Local Partnership Program	Assumption Base: Bay Area population share of prescribed statewide set-aside from the Road Maintenance and Rehabilitation Account	$1.2	$0.6	$0.6	$0.0
Local Planning	Assumption Base: Bay Area population share of prescribed statewide set-aside from the Road Maintenance and Rehabilitation Account	$0.1	$0.1	$0.1	$0.0
Low Carbon Transit Operations Program Population-Based	Assumption Base: $2.9 billion per year in Cap and Trade auction proceeds Distribution Base: Bay Area receives 19% of funds	$0.4	$0.2	$0.2	$0.0
Low Carbon Transit Operations Program Revenue-Based	Assumption Base: $2.9 billion per year in Cap and Trade auction proceeds Distribution Base: Bay Area receives 52% of funds	$1.1	$0.5	$0.6	$0.0
Low Carbon Fuel Standard Program	Source: Transit operator estimates based on CARB forecasts	$13.0	$6.1	$6.8	$0.0
Proposition 1B	N/A	$0.0	$0.0	$0.0	$0.0

REVENUE SOURCE	PLAN BAY AREA 2050 REVENUE ASSUMPTIONS	PLAN BAY AREA 2050 TOTAL REVENUE	REVENUE BIN 1 FY 2021 - FY 2035	REVENUE BIN 2 FY 2036 - FY 2050	REVENUE BIN 3 FLEXIBLE AVAILABILITY
Solutions for Congested Corridors	Assumption Base: Senate Bill 1 program revenue Distribution Base: Bay Area receives 30% of funds	$3.8	$1.4	$2.4	$0.0
State Bridges and Culverts	Assumption Base: Bay Area population share of prescribed statewide set-aside from the Road Maintenance and Rehabilitation Account	$2.3	$1.1	$1.2	$0.0
State Highway Operations and Protection Program (SHOPP) (Note: Program includes a mix of federal and state funds)	Assumption Base: 2019 SHSMP and estimate of gas tax revenue Distribution Base: Bay Area receives 20% of funds	$26.1	$11.0	$15.1	$0.0
State Transit Assistance (STA) Population-Based	Assumption Base: FY 2018/19 Distribution Base: Bay Area receives 20% of funds	$2.9	$1.2	$1.7	$0.0
State Transit Assistance (STA) Revenue-Based	Assumption Base: 2018-19 Distribution Base: Bay Area receives 52% of funds	$7.8	$3.2	$4.6	$0.0
State Transit Assistance Capital - Population Based	Assumption Base: FY 2018/19 Distribution Base: Bay Area receives 20% of funds	$0.5	$0.2	$0.3	$0.0

REVENUE SOURCE	PLAN BAY AREA 2050 REVENUE ASSUMPTIONS	PLAN BAY AREA 2050 TOTAL REVENUE	REVENUE BIN 1 FY 2021 - FY 2035	REVENUE BIN 2 FY 2036 - FY 2050	REVENUE BIN 3 FLEXIBLE AVAILABILITY
State Transit Assistance Capital - Revenue Based	Assumption Base: 2018-19 Distribution Base: Bay Area receives 52% of funds	$1.4	$0.5	$0.9	$0.0
State Transportation Improvement Program (STIP): Regional Transportation Improvement Program (RTIP) County Shares	Assumption Base: 2020 STIP FE and estimate of gas tax revenue Distribution Base: Bay Area historical share of total funds	$3.1	$1.2	$1.9	$0.0
STIP: Interregional Road/Intercity Rail (ITIP)	Assumption Base: 2020 STIP FE and estimate of gas tax revenue Distribution Base: Bay Area historical share of total funds	$0.8	$0.3	$0.5	$0.0
Trade Corridor Enhancement	Assumption Base: Senate Bill 1 program revenue Distribution Base: Bay Area receives 20% of funds	$2.6	$1.1	$1.6	$0.0
Transit and Intercity Rail	Assumption Base: $2.9 billion per year in Cap and Trade auction proceeds + Senate Bill 1 program revenue Distribution Base: Bay Area receives 30% of funds	$6.2	$2.6	$3.6	$0.0

REVENUE SOURCE	PLAN BAY AREA 2050 REVENUE ASSUMPTIONS	PLAN BAY AREA 2050 TOTAL REVENUE	REVENUE BIN 1 FY 2021 - FY 2035	REVENUE BIN 2 FY 2036 - FY 2050	REVENUE BIN 3 FLEXIBLE AVAILABILITY
University Research	Assumption Base: Bay Area population share of prescribed statewide set-aside from the Road Maintenance and Rehabilitation Account	$0.0	$0.0	$0.0	$0.0
Workforce Development	Assumption Base: Bay Area population share of prescribed statewide set-aside from the Road Maintenance and Rehabilitation Account	$0.0	$0.0	$0.0	$0.0
State Total	**State Total**	**$103.3**	**$43.1**	**$58.6**	**$1.6**
REGIONAL					
2% Toll Revenues	Base Year: FY 2018-19 Source: BATA Growth Rate: 0.3%-0.6%	$0.1	$0.1	$0.1	$0.0
5% State General Funds	Base Year: FY 2018-19 Source: BATA Growth Rate: 0.3%-0.6%	$0.1	$0.1	$0.1	$0.0
Active Transportation Program (ATP) - Regional Program (Note: Program includes a mix of federal and state funds)	Assumption Base: FY 2017-18 Distribution Base: Bay Area share based on ATP formula	$0.6	$0.3	$0.3	$0.0

REVENUE SOURCE	PLAN BAY AREA 2050 REVENUE ASSUMPTIONS	PLAN BAY AREA 2050 TOTAL REVENUE	REVENUE BIN 1 FY 2021 - FY 2035	REVENUE BIN 2 FY 2036 - FY 2050	REVENUE BIN 3 FLEXIBLE AVAILABILITY
AB 1107 ½-cent Sales Tax in three BART counties (25% MTC Administered Share)	Assumption Base: Weighted average of county sales tax authority estimates for the three counties of the BART District	$4.6	$1.8	$2.8	$0.0
AB 1107 ½-cent Sales Tax in three BART Counties (75% BART Share)	Assumption Base: Weighted average of county sales tax authority estimates for the three counties of the BART District	$13.8	$5.3	$8.5	$0.0
AB 1171	Base Year: FY 2018-19 Source: BATA Growth Rate: 0.3%-0.6%	$0.5	$0.3	$0.3	$0.0
AB 434 (Transportation Fund for Clean Air – Regional) – 60% of funding	Base Year: FY 2018-19 Source: DMV data Growth Rate: MTC estimate based on Vehicle Registration data	$0.5	$0.2	$0.2	$0.0
AB 664	Base Year: FY 2018-19 Source: BATA Growth Rate: 0.3%-0.6%	$0.5	$0.2	$0.3	$0.0
BATA Base Toll Revenues	Base Year: FY 2018-19 Source: BATA Growth Rate: 0.3%-0.6%	$4.5	$2.2	$2.4	$0.0

REVENUE SOURCE	PLAN BAY AREA 2050 REVENUE ASSUMPTIONS	PLAN BAY AREA 2050 TOTAL REVENUE	REVENUE BIN 1 FY 2021 - FY 2035	REVENUE BIN 2 FY 2036 - FY 2050	REVENUE BIN 3 FLEXIBLE AVAILABILITY
Regional Measure 3 (RM3)	Base Year: FY 2018-19 - Assumes indexing of toll after 2025 Source: BATA Growth Rate: 0.3%-0.6%	$14.2	$5.5	$8.8	$0.0
Regional Express Lane Network Revenues	Source: BAIFA estimates	$2.1	$0.9	$1.2	$0.0
Regional Measure 2 (RM2)	Base Year: FY 2018-19 Source: BATA Growth Rate: 0.3%-0.6%	$4.0	$1.9	$2.1	$0.0
RM1 Rail Extension Reserve	Base Year: FY 2018-19 Source: BATA Growth Rate: 0.3%-0.6%	$0.4	$0.2	$0.2	$0.0
Service Authority for Freeway and Expressways (SAFE)	Base Year: FY 2018-19 Source: DMV data Growth Rate: MTC estimate based on Vehicle Registration data	$0.2	$0.1	$0.1	$0.0
Seismic Surcharge with Carpool	Base Year: FY 2018-19 Source: BATA Growth Rate: 0.3%-0.6%	$4.3	$2.1	$2.3	$0.0
Seismic Retrofit Account (Caltrans)	Base Year: FY 2018-19 Source: BATA Growth Rate: 0.3%-0.6%	$4.0	$1.9	$2.1	$0.0

REVENUE SOURCE	PLAN BAY AREA 2050 REVENUE ASSUMPTIONS	PLAN BAY AREA 2050 TOTAL REVENUE	REVENUE BIN 1 FY 2021 - FY 2035	REVENUE BIN 2 FY 2036 - FY 2050	REVENUE BIN 3 FLEXIBLE AVAILABILITY
Seismic Retrofit	Base Year: FY 2018-19 Source: BATA Growth Rate: 0.3%-0.6%	$4.0	$1.9	$2.1	$0.0
Regional Total	**Regional Total**	**$58.3**	**$24.6**	**$33.7**	**$0.0**
LOCAL					
AB 434 (Transportation Fund for Clean Air – County Program Manager) – 40% of funding	Base Year: FY 2018-19 Source: DMV data Growth Rate: MTC estimate based on Vehicle Registration data	$0.3	$0.1	$0.2	$0.0
County Sales Tax Measures	Estimates provided by county sales tax authorities	$54.8	$28.7	$26.1	$0.0
County Sales Tax Measures - Reauthorizations	Estimates provided by county sales tax authorities	$22.6	$0.9	$21.8	$0.0
County Vehicle Registration Fees	Base Year: FY 2018-19 Source: DMV data Growth Rate: MTC estimate based on Vehicle Registration data	$1.1	$0.6	$0.6	$0.0
County Vehicle Registration Fees - Reauthorization	Base Year: FY 2018-19 Source: DMV data Growth Rate: MTC estimate based on Vehicle Registration data	$0.1	$0.0	$0.1	$0.0

REVENUE SOURCE	PLAN BAY AREA 2050 REVENUE ASSUMPTIONS	PLAN BAY AREA 2050 TOTAL REVENUE	REVENUE BIN 1 FY 2021 - FY 2035	REVENUE BIN 2 FY 2036 - FY 2050	REVENUE BIN 3 FLEXIBLE AVAILABILITY
Express Lane Revenue (county managed)	Source: Alameda CTC, BAIFA, VTA estimates	$2.2	$0.8	$1.4	$0.0
Golden Gate Bridge Toll	Estimates based on data from the Golden Gate Bridge, Highway and Transportation District	$5.4	$2.6	$2.8	$0.0
Local Funding for Streets and Roads (excludes local sales taxes)	Source: 2018 CA Statewide Local Streets and Roads Needs Assessment	$16.0	$6.5	$9.5	$0.0
Property Tax/ Parcel Taxes	Base Year: FY 2018-19 Data Source: AC Transit, BART, Marin Transit, WETA	$9.9	$3.8	$6.2	$0.0
San Francisco Municipal Transportation Agency (SFMTA) General Fund and Parking/Fine Revenues	Estimates based on data from the SFMTA	$30.8	$12.5	$18.3	$0.0
San Francisco Transportation Sustainability Fee	Estimates based on data from the City and County of San Francisco	$0.4	$0.2	$0.2	$0.0
San Francisco Prop D (2019 TNC Tax)	Estimates based on data from the City and County of San Francisco	$0.8	$0.4	$0.4	$0.0
SMART Sales Tax in Marin and Sonoma Counties	MTC estimate based on weighted averages of Marin and Sonoma sales tax revenue as forecast by TAM and SCTA	$0.4	$0.4	$0.0	$0.0

REVENUE SOURCE	PLAN BAY AREA 2050 REVENUE ASSUMPTIONS	PLAN BAY AREA 2050 TOTAL REVENUE	REVENUE BIN 1 FY 2021 - FY 2035	REVENUE BIN 2 FY 2036 - FY 2050	REVENUE BIN 3 FLEXIBLE AVAILABILITY
SMART Sales Tax in Marin and Sonoma Counties - Reauthorization	MTC estimate based on weighted averages of Marin and Sonoma sales tax revenue as forecast by TAM and SCTA	$1.5	$0.4	$1.1	$0.0
Transit Fare Revenues	Base Year: FY 2018-19 Data Source: Each operator Growth Rate: Based on operators' estimates	$51.6	$19.2	$32.4	$0.0
Transit Non-Fare Revenues	Base Year: FY 2018-19 Data Source: Each operator Growth Rate: Based on operators' estimates	$11.8	$4.3	$7.5	$0.0
Transportation Development Act (TDA)	Estimates based on sales tax forecasts developed by county sales tax authorities (for Solano County is based on a ten-year retrospective analysis of actual TDA receipts)	$19.6	$7.5	$12.1	$0.0
Local Total	**Local Total**	**$229.5**	**$88.8**	**$140.7**	**$0.0**

REVENUE SOURCE	PLAN BAY AREA 2050 REVENUE ASSUMPTIONS	PLAN BAY AREA 2050 TOTAL REVENUE	REVENUE BIN 1 FY 2021 - FY 2035	REVENUE BIN 2 FY 2036 - FY 2050	REVENUE BIN 3 FLEXIBLE AVAILABILITY
Anticipated/ Unspecified					
Anticipated/ Unspecified	Growth Rate: 2.2% Data Source: Retrospective analysis of a 15-year period (FY 2005-06 to FY 2019-20)	$20.8	$0.0	$0.0	$20.8
Anticipated/ Unspecified Total	**Anticipated/ Unspecified Total**	**$20.8**	**$0.0**	**$0.0**	**$20.8**
New Revenues					
Mega Measure	Assumes a 1% sales tax in all nine counties, starting in FY 2032-33. Estimates based on sales tax forecasts developed by county sales tax authorities (for Solano County is based on a ten-year retrospective analysis of actual TDA receipts)	$55.4	$7.5	$47.9	$0.0
Plan Bay Area 2050 Per-Mile Tolling Strategy	Assumes a per-mile fee on select freeways with transit alternatives ranging from 5 to 15 cents per mile, beginning as early as 2030	$25.0	$3.0	$22.0	$0.0
Plan Bay Area 2050 Parking Pricing Strategy	Assumes a 25 to 50 cent per hour parking cost for all Plan Bay Area 2050 Growth Geographies	$13.0	$0.0	$13.0	$0.0

REVENUE SOURCE	PLAN BAY AREA 2050 REVENUE ASSUMPTIONS	PLAN BAY AREA 2050 TOTAL REVENUE	REVENUE BIN 1 FY 2021 - FY 2035	REVENUE BIN 2 FY 2036 - FY 2050	REVENUE BIN 3 FLEXIBLE AVAILABILITY
Plan Bay Area 2050 Other New User Fees	Assumes user fees from new express lanes, congestion pricing in Downtown San Francisco and Treasure Island, SR-37 tolling, and new transit fares.	$16.3	$6.0	$10.3	$0.0
New Revenues Total	New Revenues Total	$109.7	$16.5	$93.2	$0.0
Secured And Other Local					
Secured and Other Local	Estimates based on secured funds generated prior to the plan period and other local funding sources related to projects (e.g., finalized land sales); per sponsoring agencies.	$19.0	$19.0	$0.0	$0.0
Secured and Other Local Total	Secured and Other Local Total	$19.0	$19.0	$0.0	$0.0
GRAND TOTAL	Grand Total	$591	$210	$348	$34
	% of Total	100%	35%	59%	6%

Roadway Operations and Maintenance Needs

For Plan Bay Area 2050, MTC estimated the funding needed to operate and maintain the existing local street and road (LSR) system, including bridges on the locally-owned system, over the 30-year plan period from FY 2020-21 to FY 2049-50. The cost of needed capital maintenance of the seven state-owned toll bridges over the same period was developed and provided by the Bay Area Toll Authority (BATA). While included in the transportation needs and revenue assessment, the cost of capital maintenance for the Golden Gate Bridge, which is not operated by BATA, was included as being roughly equivalent to the toll revenue estimate. MTC also used information developed by the California Department of Transportation (Caltrans), in conjunction with a pavement needs assessment conducted by MTC using the StreetSaver® pavement management system software, to estimate the cost of capital maintenance of the state highway system within the nine-county Bay Area over the Plan Bay Area 2050 planning horizon.

On the cost side, this analysis has two components for local streets and roads: (a) the cost of maintaining the local street and road network at its current condition level; and (b) the cost of improving the network and maintaining it in a state of good repair. For bridges and state highways, information available allowed only for the estimation of cost needed to reach and maintain a state of good repair. On the revenue side, the analysis includes revenues that are committed to operating and capital costs by law or local policy, as well as discretionary funds allocated to transit operating or capital needs by MTC.

As shown in Table 8, to reach a state of good repair across the Bay Area's local street and road network, local bridges, toll bridges and state highways, the region will need to spend some $117 billion over the next 30 years. An estimated $97 billion is estimated to be available during the course of Plan Bay Area 2050, leaving a remaining need of approximately $18 billion to maintain existing conditions and a remaining need of $25 billion to reach a state of good repair.

Table 8. Plan Bay Area 2050 local road, bridge, and state highway needs and revenue summary (in millions of YOE$)

ASSET CATEGORY	COMMITTED REVENUE	NEED (STATE OF GOOD REPAIR)	NEED (MAINTAIN CONDITIONS)	REMAINING NEED (STATE OF GOOD REPAIR)	REMAINING NEED (MAINTAIN CONDITIONS)
Local Streets and Roads	$45,400	$68,200	$61,700	$22,800	$16,300
Local Bridges	$1,800	$2,600	$2,600	$1,000	$1,000
State Highways	$28,400	$24,400	$24,400	$0	$0
Regional Bridges	$21,200	$21,900	$21,900	$800	$800
Total	**$96,800**	**$117,100**	**$110,600**	**$24,600**	**$18,100**

Local Streets and Roads

The Bay Area's local street and road (LSR) network, in addition to over 42,000 lane miles of roadway used by cars, buses, trucks and bicycles, also includes thousands of miles of curbs and gutters, sidewalks, storm drains, traffic signs, signals and lights. These "non-pavement" items are necessary for a functioning street and road network. The LSR system provides the foundation for all modes of travel and is vital to the safety, livability and economic health of the Bay Area.

The average condition of the Bay Area's LSR network, rated on a scale of 0 to 100, is currently at 67. This pavement condition index (PCI) places the region's roadway network in the "fair" category. The classifications used to rate LSR pavements are shown in Table 9 below.

Table 9. Pavement Condition Index rating scale

PAVEMENT CONDITION INDEX (PCI) CATEGORY	DEFINITION
Very Good-Excellent (PCI = 80-100)	Pavements are newly constructed or resurfaced and have few if any signs of distress
Good (PCI = 70-79)	Pavements require mostly preventive maintenance and have only low levels of distress, such as minor cracks or spalling, which occurs when the top layer of asphalt begins to peel or flake off as a result of water permeation.
Fair (PCI = 60-69)	Pavements at the low end of this range have significant levels of distress and may require a combination of rehabilitation and preventive maintenance to keep them from deteriorating rapidly.
At Risk (PCI = 50-59)	Pavements are deteriorated and require immediate attention including rehabilitative work. Ride quality is significantly inferior to better pavement categories.
Poor (PCI = 25-49)	Pavements have extensive amounts of distress and require major rehabilitation or reconstruction. Pavements in this category affect the speed and flow of traffic significantly.
Failed (PCI = 0-24)	Pavements need reconstruction and are extremely rough and difficult to drive on.

While the region's average pavement condition is considered fair, it is important to note that the deterioration curve of a typical pavement is exponential, and not linear. As shown in Figure 1 below, a new pavement will deteriorate slowly for the first 15 years of its standard 20-year life span. Once it reaches a Pavement Condition Index (PCI) of 60, it will begin to deteriorate rapidly. Without any intervention, the pavement can drop from the fair category to the "failed" category in as little as five years. This deterioration holds serious implications for the cost of system preservation. Pavements that are still in good condition (a PCI of 70 or above) can be preventively maintained at a low cost, whereas pavements that need significant rehabilitation or reconstruction require five to 15 times the amount of funding. Once pavements fall below a PCI of 60, users of the roadways begin to experience increasing vehicle operating costs associated with wear and tear damage to their vehicles and additional fuel costs.

Figure 1. Pavement life cycle

PAVEMENT LIFE CYCLE
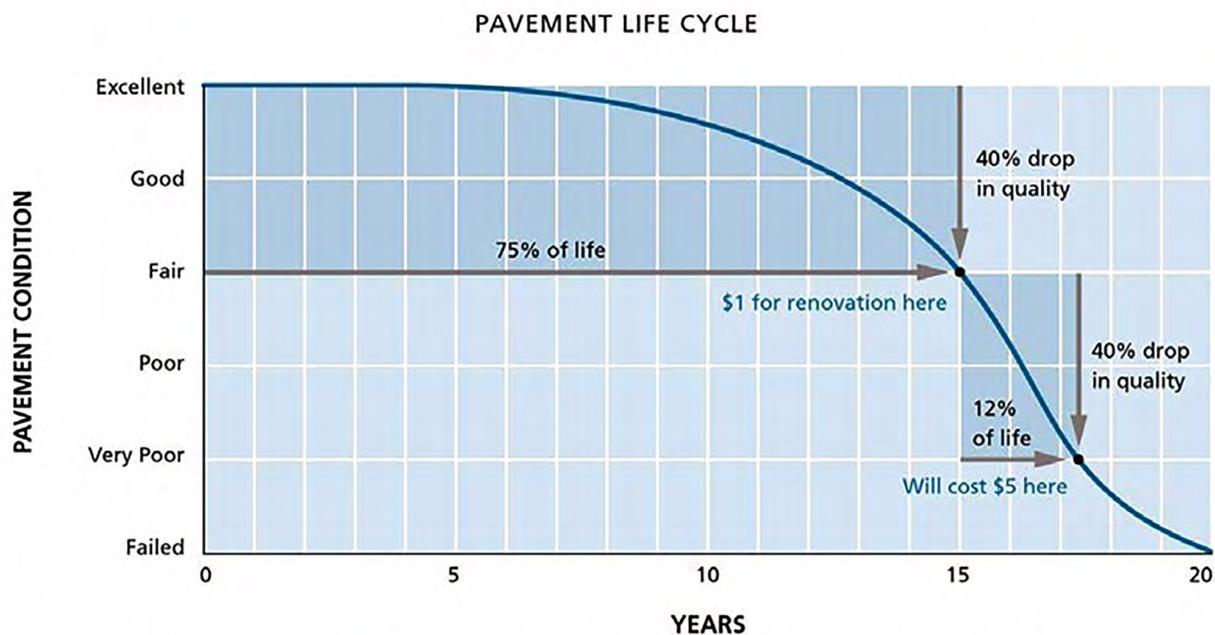
Time varies depending on traffic, climate, pavement design, etc.

The needs assessment for the region's local street and road system leverages a biennial survey conducted as part of the California Local Streets and Roads Needs Assessment. The LSR needs assessment for Plan Bay Area 2050 is based on the survey conducted in 2018, which provided information on Bay Area unit costs for pavement maintenance treatments, estimates of non- pavement asset inventories and replacement costs, and information on local jurisdiction revenues available for roadway operations and capital maintenance. This survey data, for which information was provided by all 109 Bay Area jurisdictions, is used in conjunction with MTC's StreetSaver® Pavement Management system — an analysis tool that estimates the cost to maintain pavements at a specified condition level — to estimate the needs of the local street and road system.

Pavement needs are estimated by using the street inventory, conditions, and projected lifecycle information contained in local jurisdictions' StreetSaver® databases. Pavement maintenance unit costs, a key input into the StreetSaver® model, were estimated by county, using information submitted by local jurisdictions to the 2018 California Local Street and Road Needs Assessment survey. The StreetSaver® model then estimates the long-term maintenance needs of each jurisdiction's street network, assuming the most cost-effective maintenance strategies are applied.

Non-pavement capital maintenance needs consist of the cost to maintain other local street and road assets that are required for a functioning street and road system. These include storm drains, sidewalks, curbs and gutters, street lights, signs and signals. To estimate the non-pavement needs on the local road system, MTC uses a prediction model developed by Nichols Consulting Engineers (NCE) that uses information provided by local jurisdictions on non-pavement asset inventory and useful life to estimate long-term costs to maintain non-pavement assets. Replacement costs are predicted based on the inventory of two non-pavement assets — curbs and gutters and streetlights. The total non-pavement asset replacement cost is then divided by the average useful life for each of the major non-pavement asset groups to estimate an annual preservation cost. The prediction model was updated with asset inventory and replacement cost information provided by local jurisdictions in responses to the 2018 California Local Street and Road Needs Assessment survey.

Capital maintenance needs consist of activities that extend the useful life of the roadway asset by five or more years. This category can be further broken down into preservation for pavements and non-pavement assets (sidewalks, storm drains, traffic signals, curbs and gutters, etc.).

The system preservation needs were calculated for two different condition level scenarios:

1. **Maintain Existing PCI** — Local jurisdictions maintain the existing pavement condition index (PCI), while deferred maintenance costs are allowed to grow.

2. **State of Good Repair** — The LSR system reaches the optimal PCI (the point at which the system is most cost effective to maintain), within the first 10 years and is maintained at this level for the duration of the plan period.

Operational costs consist of routine maintenance such as pothole filling, street sweeping and striping, as well as overhead expenses. Operations costs were assumed to have first call on projected LSR revenue and were projected to total $20.5 billion for the region over the plan period.

Projected LSR capital and operating needs by county are summarized in Table 10 below. The total cost includes needs for both pavement and non-pavement maintenance, as well as operations. As a region, committed funding identified for LSR covers approximately 52% of the total needed to meet a state of good repair, and about 61% of the amount need to maintain conditions at existing service levels. The Plan Bay Area 2050 Transportation Project List includes $61,900 in funding to maintain existing conditions on the region's local streets, going slightly beyond the need to maintain existing conditions.

Table 10. Plan Bay Area 2050 local streets and roads needs and revenue (in millions of YOE$)

COUNTY	COMMITTED REVENUE	NEED (STATE OF GOOD REPAIR)	NEED (MAINTAIN EXISTING CONDITIONS)	REMAINING NEED (STATE OF GOOD REPAIR)	REMAINING NEED (MAINTAIN CONDITIONS)
Alameda	$8,300	$12,200	$11,100	$3,900	$2,800
Contra Costa	$4,900	$8,800	$8,000	$3,900	$3,100
Marin	$1,600	$2,400	$2,100	$800	$500
Napa	$1,800	$2,000	$1,600	$200	$0
San Francisco	$9,300	$11,800	$11,200	$2,500	$1,900
San Mateo	$3,900	$5,700	$5,300	$1,800	$1,400
Santa Clara	$9,800	$15,100	$14,000	$5,300	$4,200
Solano	$2,000	$4,100	$3,600	$2,200	$1,600
Sonoma	$3,800	$6,100	$4,700	$2,300	$900
Total	**$45,400**	**$68,200**	**$61,700**	**$22,800**	**$16,300**

State Highways

The needs assessment for the state highway system relies on information provided by Caltrans in its 2018 State Highway Operations and Protection Program (SHOPP) Plan, and analysis of the District 4 (Bay Area) highway road conditions and projected needs using the StreetSaver® model. Future adjustments to the state highway needs assessment may be made to account for specific Bay Area operational needs over and above the assumed Bay Area population share of these needs as incorporated in the SHOPP forecast, and additional input that may be provided by Caltrans staff.

Every two years, Caltrans produces a 10-year estimate of needs to preserve and maintain the state highway system and its supporting infrastructure. The 2018 SHOPP Plan contains a "Goal Constrained Needs Plan" that is an estimate of costs to meet defined performance goals over a 10-year period for the following major categories:

- Major Damage Restoration
- Collision Reduction
- Mandates
- Mobility Improvement
- Minor Program
- Bridge, Roadway and Roadside Preservation
- Facility Improvement

The 2018 SHOPP Plan also contains a "Financially Constrained Needs Plan" that is constrained by the amount of funds expected to be available for expenditure on preservation needs in the same categories as listed above.

To estimate the needs, MTC staff escalated the Goal Constrained funding needs to 2021 dollars, using a 2.2% inflation rate and projected these needs out 10 years to FY 2030-31. For FY 2031-32 through FY 2049-50, staff used estimates contained in the Financially Constrained Needs Plan, escalated to nominal dollars. This shift to a lower needs level after year 10 is based on the assumption that the funding levels assumed for the first 10 years of the forecast are sufficient to bring the state highway system to a state of good repair, after which ongoing maintenance costs would be lower. This assumption is consistent with the assumption made in the local street and road and transit capital maintenance needs assessments. To estimate the Bay Area's share of the state highway needs, staff applied the Bay Area's population share, relative to the state, to the statewide 30-year total. In addition, staff substituted the estimated roadway preservation needs for the StreetSaver® generated estimate, as described below.

MTC used information on state highway lane mileage and pavement conditions, coupled with information provided by Caltrans on pavement maintenance treatment costs and practices, to develop a StreetSaver® database for the state highways in the region. In consultation with Caltrans staff, the model was then used to project the long-term pavement capital maintenance needs to meet and maintain a state of good repair. The state of good repair model results were then substituted for the roadway maintenance cost estimated using the region's population share of the statewide need based on the SHOPP Plan, as described above.

The committed revenue estimate was $4 billion higher than the need to maintain a state of good repair. It was assumed that the excess SHOPP funding can be made available for other maintenance projects on the region's State Highway system, including but not limited to sea level rise mitigations that protect vulnerable segments of the system from flooding.

Table 11. Plan Bay Area 2050 state highway projected needs and revenues (In millions of YOE$)

	COMMITTED REVENUE	NEED (STATE OF GOOD REPAIR)	REMAINING NEED (STATE OF GOOD REPAIR
Total	$28,400	$24,400	$0

Local Bridges

The nearly 2,000 locally owned bridges in the San Francisco Bay Area are essential links that help connect the state's communities, provide mobility for travelers, support efficient movement of freight and relieve traffic congestion.

All of the region's bridges require some level of investment over time to remain in service. Even if a bridge is well-maintained, it is eventually necessary to rehabilitate or replace the bridge due to deterioration of its components. Further, many bridges are improved or replaced for functional reasons, such as having been designed to carry lighter loads, less traffic or smaller vehicles than they now carry. Deferring maintenance on a bridge may save money in the short term, but it can force more costly repairs to be required sooner — ultimately increasing costs in the long term.

The Federal Highway Administration's National Bridge Investment Analysis System (NBIAS) system was used to develop the projections of capital maintenance need for our region's locally owned bridges. NBIAS has a modeling approach similar to that of the Pontis Bridge Management System (BMS) used by Caltrans for managing its bridges. However, NBIAS requires only publicly available National Bridge Inventory (NBI) data to run. Pontis requires detailed element data that are not part of the NBI.

Though NBIAS is populated with default costs, deterioration models and other parameters, these were calibrated to regional costs and conditions in order to provide as realistic a projection as possible of the cost to maintain Bay Area bridges. Further, seismic retrofit needs, which are not modeled by NBIAS, were calculated and applied to the results.

The results obtained from NBIAS provide a projection of bridge investment needs over time for different budget assumptions. Investment needs are funds that should be invested to minimize bridge costs over time and to address economically justified functional improvements. To the extent that projected funds are insufficient for addressing all needs, the system simulates what investments will occur with an objective of maximizing benefits given an available budget. The system also predicts what new needs may arise, considering deterioration and traffic growth, and projects a range of different physical measures of bridge condition.

Table 12 below summarizes the locally owned bridge capital maintenance needs and projected revenue by county.

Table 12. Plan Bay Area 2050 local bridge projected needs and revenues (In millions of YOE$)

COUNTY	COMMITTED REVENUE	NEED (STATE OF GOOD REPAIR)	REMAINING NEED (STATE OF GOOD REPAIR)
Alameda	$350	$200	$0
Contra Costa	$150	$400	$250
Marin	$0	$150	$100
Napa	$200	$150	$0
San Francisco	$200	$100	$0
San Mateo	$200	$350	$100
Santa Clara	$450	$500	$50
Solano	$100	$200	$100
Sonoma	$200	$600	$400
Total	**$1,850**	**$2,550**	**$990**

Regional Bridges

There are seven state-owned toll bridges that span San Francisco Bay. These include the Antioch, Benicia, Carquinez, Dumbarton, Richmond/San Rafael, San Mateo/Hayward, and San Francisco-Oakland Bay bridges. The Golden Gate Bridge is not state-owned, but still spans the Bay and is considered a regional bridge for the purposes of this needs assessment.

To determine the capital maintenance needs of the state-owned bridges, MTC worked with BATA staff. BATA maintains detailed cost projections and budget schedules in order to plan and deliver bridge maintenance projects out to FY 2035-36. Planned and anticipated maintenance and rehabilitation projects for each bridge are categorized into the following categories:

- **Category 1** – Structural Elements Rehab
- **Category 2** – Deck Rehab
- **Category 3** – Base System
- **Category 4** – Structural Steel Painting
- **Category 5** – Bridge and Pavement Approaches
- **Category 6** – Electrical/Mechanical
- **Category 7** – Facilities

The Golden Gate Bridge Highway and Transit District is responsible for the capital maintenance of the Golden Gate Bridge, and for ensuring sufficient revenue is generated to meet those needs. The Golden Gate Bridge capital maintenance needs are assumed to be equivalent to the total Golden Gate Bridge toll revenue forecasted to be collected over the 30-year PBA 2050 period, less toll funds set aside for transit operations. Total toll revenue for the Golden Gate Bridge capital maintenance needs over the 30-year Plan Bay Area 2050 period is approximately $3.4 billion.

To estimate capital maintenance costs for the period from FY 2036-37 to FY 2049-50 staff calculated the average annual real cost over the period from FY 2020-21 to FY 2035-36 and applied the 2.2% growth rate to that figure for the four remaining years. In addition to the projected future capital maintenance costs, BATA projected the cost of on-going debt-financing for capital maintenance and rehabilitation/replacement projects already performed or underway on the state-owned bridges in order to determine the total regional bridge-related expense over the PBA 2050 period.

The projected expenses and revenues for the region's eight regional toll bridges are summarized in Table 13 below.

Table 13. Plan Bay Area 2050 regional bridge needs and revenue (in millions of YOE$)

	COMMITTED REVENUE	NEED (STATE OF GOOD REPAIR)	REMAINING NEED (STATE OF GOOD REPAIR)
Total	$21,200	$21,900	$800

Transit Operating Needs

For Plan Bay Area 2050, MTC estimated the funding needed to operate and maintain existing transit services over the 30-year plan period from FY 2020-21 to FY 2049-50. On the cost side, the analysis has two components: (a) operating and maintenance costs; and (b) capital replacement and rehabilitation costs. The estimate of needs includes the cost to maintain transit assets in a state of good repair — meaning assets are replaced at the end of their useful lives — and the cost to maintain transit capital assets at their condition levels as well as to maintain existing service levels for public transit. On the revenue side, the analysis includes revenues that are committed to transit operating or capital costs by law or by MTC or transit agency policy, and discretionary funds allocated to transit operating or capital needs by MTC or county transportation agencies (CTAs).

As shown in Table 14 below, to reach a state of good repair in addition to being able to maintain existing service levels for public transit, the region will need to spend an estimated total of $295 billion over the next 30 years. Revenues estimated to be available for the operation and maintenance of the existing system total $237 billion, leaving a remaining need of approximately $33 billion to maintain existing conditions and $57 billion to reach a state of good repair.

Table 14. Transit Operating and Capital Needs and Revenue Summary (in millions of YOE$)

MODE	COMMITTED REVENUES	NEED (MAINTAIN CONDITIONS)	NEED (STATE OF GOOD REPAIR)	REMAINING NEED (MAINTAIN CONDITIONS)	REMAINING NEED (STATE OF GOOD REPAIR)
Transit Operating*	$208,000	$211,000	$211,000	$3,000	$3,000
Transit Capital	$29,200	$59,500	$83,600	$30,300	$54,400
Total	**$237,200**	**$270,500**	**$294,600**	**$33,300**	**$57,400**

*NOTE: Strategy T1 includes $3 billion in Bin 1 monies to enable restoration of transit service hours to 2019 levels, which would be fully funded with federal COVID-19 relief funds for public transit through the CARES Act, CRRSAA and the ARP.

In spring 2019, almost a year prior to the onset of the COVID-19 pandemic, MTC distributed a Transit Operating Needs Assessment Survey to each of the Bay Area's 25 transit operators. This survey gathered information on current and planned service levels; existing and projected operating costs; and existing and projected local operating revenues over the Plan Bay Area 2050 period. Staff received survey data for each of the 25 surveys distributed to transit operators.

The cost to operate and maintain existing service levels was projected by the transit operators. MTC requested a cost breakdown of expenses by mode (bus, paratransit, rail, etc.) and system-wide non-operating expenses, including debt service, by year of expenditure. Transit operators also provided planned service changes associated with committed capital projects and/or fully funded future increases in service hours over the Plan Bay Area 2050 period.

Inflation assumptions were checked for reasonableness across similar expense categories. The cost impact of projected changes in service levels during the plan period was accounted for only in instances where those changes are a result of the transit operators' policy directives. The operating cost projections include existing service levels and cost projections for committed expansion projects. Where there were questions on the assumptions, MTC worked with the transit operator to get clarification and used information deemed most accurate by the transit operator.

Transit operating revenues come from a variety of fund sources including dedicated local funds that are controlled by transit operators such as transit fares, non-fare revenue (such as general fund contributions or revenue from advertising), other revenue (such as that from charter service), and county sales tax for operating and maintenance needs. Revenue estimates and projections for these sources are developed by transit operators and incorporated into the needs assessment. MTC developed revenue estimates for fund sources for which MTC has some role or discretion in distributing, including State Transit Assistance (STA), AB 1107 sales tax, Transportation Development Act (TDA) sales tax funds, bridge tolls, and Federal Transit Administration Funds.

Staff assumed sales tax growth rates for county sales tax measures, transit sales taxes, and TDA are consistent with the sales tax growth rates provided by the sales tax authorities. Where necessary, sales tax growth rates provided by operators were adjusted. This is consistent with the Plan Bay Area 2050 financial assumptions and transportation revenue forecast. Some fund sources are restricted by statute or policy to either operations or capital uses, while others are flexible. MTC staff generally assumed that all flexible transit revenues would first cover operating expenses; and then additional revenue, if any, was assigned to capital replacement if there was an identified need.

Impact of COVID-19 on Transit Operating Needs and Revenues

The COVID-19 pandemic has presented an unprecedented challenge to the delivery of public transit service in the Bay Area. Because the transit operating needs assessment was conducted a year prior to the onset of the pandemic, the data contained in it does not reflect the exact transit service levels and conditions in operation as of October 2021. As of the writing of this report, transit operators are in the process of restoring transit service, but it is uncertain the exact levels of service that will be in operation in the coming months and years.

Because of the uncertainty and impacts of the COVID-19 pandemic on transit operating revenues and service levels, Plan Bay Area 2050 assumes that in the absence of additional investments, transit service would be operated at levels commensurate with available funding through FY 2035-36 and at levels planned before the pandemic for the remainder of the plan period. This assumption in no way precludes the restoration of transit service levels before FY 2035-36 as revenues become available, but it recognizes the significant unknowns about the immediate future while prioritizing investments in transit service, transit state of good repair and transit expansion projects over the 30-year planning period.

Plan Bay Area 2050 includes an additional investment to restore transit service hours to 2019 levels starting in FY 2029-30 in the Plan and EIR Alternatives, as part of Strategy T1. Similarly, this does not preclude the restoration of transit service hours earlier than what was analyzed. Projected operating expenses and revenues for the restored transit service represented in the Plan and EIR Alternatives are summarized in Table 15.

Table 15. Plan Bay Area 2050 transit operating needs and revenues (in millions of YOE$)

TRANSIT OPERATOR	30 YEAR TOTAL COSTS (ALL MODES)	30 YEAR PLAN BAY AREA 2050 INVESTMENT
ACE	$2,300	$2,300
AC Transit	$21,900	$21,900
BART	$52,900	$52,900
Caltrain	$13,600	$13,600
CCCTA	$1,800	$1,800
City of Dixon	$100	$100
ECCTA	$1,100	$1,100
City of Fairfield	$1,200	$1,200
GGBHTD	$5,700	$5,700
LAVTA	$1,000	$1,000
Marin Transit	$1,400	$1,400
NVTA	$900	$900
City of Petaluma	$100	$100
City of Rio Vista	$100	$100
SFMTA	$58,900	$58,900
SamTrans	$11,800	$11,800
SMART	$2,200	$2,200
City of Santa Rosa	$600	$600
Solano County Transit	$800	$800
Sonoma County Transit	$800	$800
Transbay Joint Powers Authority	$2,100	$2,100
Union City Transit	$300	$300
City of Vacaville	$200	$200
VTA	$26,300	$26,300
WCCTA	$700	$700
WETA	$2,400	$2,400
Total	**$211,000**	**$211,000**

Transit Asset Maintenance Needs

This report details the background and methodology used for developing a long-range estimate for transit capital funding in the Bay Area. The report employs a modified version of FTA's Transit Economic Requirements Model (TERM) Lite model that develops estimates for the financial requirements to achieve specified performance outcomes, as well as estimates for performance outcomes given available funding. Using an aggregated inventory of capital assets submitted by partner transit agencies, the model projects capital needs such as replacement, rehabilitation, and ongoing annual capital maintenance activities and compares that against available funding to meet those needs. The model output includes a detailed summary of the actions projected for each asset and investment year over the 30-year horizon.

There are three inputs to the model:

1. A detailed dataset of assets held by all Bay Area transit operators

2. A forecast of Transit Capital funding available by year and funding source

3. A list of asset types and the assumed rehabilitation schedules for those asset types.

Given these inputs, the model is used to output several analyses:

1. **The financial need to reach a point where all transit capital assets are in a state of good repair within 10 years and maintain those conditions for the remainder of the plan period.** In this scenario, the total backlog reaches $0 and is maintained over time.

2. **The financial need to maintain the *current* conditions of transit capital assets for the entirety of the plan period.** In this scenario, the backlog grows only by inflation, keeping the total backlog on par with the current ratio of backlog to asset value.

3. **Given planned investment, an estimate of the predicted conditions of transit capital during the plan period.** This scenario incorporates asset eligibility for different funding sources into the model.

Inputs

RTCI Database

The Regional Transit Capital Inventory (RTCI) is a comprehensive regional database of the transit assets owned by Bay Area transit agencies. The objective of the RTCI is to collect consistent and comparable data on the region's transit capital assets, and on replacement and rehabilitation costs for each transit operator. The asset information contained in the database is provided by Bay Area operators and represents a significant effort to ensure that assets in the region are maintained in a state of good repair. The database is updated annually. The RTCI data collected from operators contains information on transit asset types (vehicles, track, stations, systems, etc.), quantities, age, useful lives and replacement costs, among other details.

Prior to importing it into the analysis tool, MTC staff screens the submitted inventory data for errors and anomalies through a rigorous, multi-layered process. This review includes consulting with agencies for clarification prior to accepting the inventory as a finalized dataset for use in modeling.

The collection of data across 25 different transit agencies carries with it margin for error. Differing maturity in asset management practices or data collection practices can result in errors in the dataset. MTC and operators have worked collaboratively to create the RTCI dataset. Information submitted to the RTCI is accepted as a good faith representation of an individual operator's current understanding of their system and the best available information at the agency regarding their capital assets.

Committed Revenues for Transit Asset Maintenance

Transit revenues currently committed to capital replacement and rehabilitation by statute or policy were assumed to remain dedicated to capital over the 30-year planning period. These sources include FTA Urbanized Area Formula (Section 5307), Bus & Bus Facilities (Section 5339), FTA State of Good Repair (Section 5337), AB 664, STA SGR funds, Sales Tax revenue, BART General Fund, FTA and FHWA ferry grants, and, as noted above, projected operating surpluses, if any.

The breakdown of total plan period funding by source is shown in the table below. For this plan, MTC has developed an enhancement to the modeling software that enables allocation of specific funding sources only to assets that are eligible for that funding. Previously, the distinction between different funding sources was not technically feasible using the FTA TERM Lite model. This new ability, unique to the version of TERM Lite used by MTC, will allow for a more accurate allocation of funding under a fiscally constrained scenario. Overall, committed revenues for transit capital maintenance totaled $29.2 billion, and were augmented by $30.3 billion in discretionary funding in the Plan Bay Area 2050 fiscally-constrained transportation project list.

Needs Assessment Methodology

The TERM Lite model combines transit asset data provided by operators with the capital revenue forecast to either determine the level of funding needed to achieve a specified state of good repair (SGR) or to project the anticipated SGR based on a specific level of forecasted funding. The former is called a backlog target seek scenario, while the latter is a fiscally constrained scenario.

Transit capital needs were defined as the cost of replacing all assets at the end of their useful lives and performing all capital rehabilitation work in accordance with the rehabilitation cycle for the asset type. The current backlog of assets past their useful life is accounted for in the model. At the start of the model, there are $12.7 billion of assets that are past their useful lives. In some cases, particularly for long-lived fixed assets such as stations or tunnels, major components were assumed to be replaced or maintained on an annualized basis, rather than replaced entirely.

The asset type table remains consistent with previous modeling efforts. The RTCI inventory from January 2020 was used for this modeling effort. Since the inventory has not changed since then, the maintain and SGR model output from that effort was used for this report as well.

TERM Lite was created by the FTA for use by agencies for capital needs modeling. The version used by MTC retains the same core functionality and business logic in fiscal projections, but it is enhanced with both the "color of money" capability that assigns funding only to eligible assets and a series of quality-of-life enhancements.

Outputs

Plan Bay Area 2050 adds $30.3 billion in discretionary funding to the $29.2 billion in committed revenues to fund the $59.5 billion need for maintaining existing conditions. Projected transit capital rehabilitation and replacement needs and revenues for all projects are summarized in Table 16. Outcomes of the funding scenarios are summarized in Table 17. The Plan Bay Area 2050 Transportation Project List includes $59,500 in funding to maintain existing conditions for the region's transit assets.

It is important to note that these Plan Bay Area 2050 funding assignments are based on projections of aggregate need over 30 years. Actual programming will vary from year to year and will consider actual project eligibility and readiness.

Table 16. Summary of total capital needs, committed funding, and shortfalls (in millions of YOE$)

ASSET CLASS	COMMITTED REVENUE	NEED (MAINTAIN CONDITIONS)	NEED (STATE OF GOOD REPAIR)	REMAINING NEED (MAINTAIN CONDITIONS)	REMAINING NEED (STATE OF GOOD REPAIR)
Facilities	$400	$4,600	$12,200	$4,200	$11,800
Guideway Elements	$700	$12,200	$11,600	$11,500	$10,900
Stations	$100	$0	$14,900	-$100	$14,800
Systems	$3,100	$17,200	$18,700	$14,200	$15,600
Vehicles	$24,900	$25,400	$26,200	$600	$1,300
Total	**$29,200**	**$59,500**	**$83,600**	**$30,300**	**$54,400**

There are a few important interpretations of these results. First, with only committed funding there are large shortfalls to either maintain existing conditions or to reach a state of good repair. With plan investment, there is no shortfall to maintain current conditions, while the shortfall to reach a state of good repair stays the same as the present-day shortfall (in real terms).

Table 17. Outcomes of funding scenarios (millions of YOE$)

	CURRENT BACKLOG	2050 SGR BACKLOG WITH COMMITTED INVESTMENT	2050 SGR BACKLOG WITH PLAN INVESTMENT
Facilities	$1,500	$11,400	$6,900
Guideway Elements	$2,400	$14,500	$0
Stations	$3,000	$17,400	$17,400
Systems	$4,000	$13,600	$200
Vehicles	$1,900	$1,500	$400
Total	**$12,800**	**$58,500**	**$24,900**

With committed investment only, the SGR backlog swells to $58.5 billion, as most asset classes see deferred maintenance and most investment going only to vehicle acquisitions. Towards the end of the model period the backlog for vehicles begins to rise again, showing that with only committed funding even vehicle replacements would begin to be affected.

With the plan investment of $59.5 billion, the backlog remains roughly stable (in real terms) over the course of the model, with considerably less deferred maintenance. Guideway elements reach a state of good repair, while vehicle and systems assets are close to a state of good repair at the end of the model period. However, Facility and Station assets continue to see deferred maintenance and make up a significant majority of the backlog in 2050. Towards the end of the model period, this backlog begins to trend downwards.

For more detail about investment and SGR backlog, see the charts in Figures 2-5 below.

Figure 2. Annual investment with committed funding only
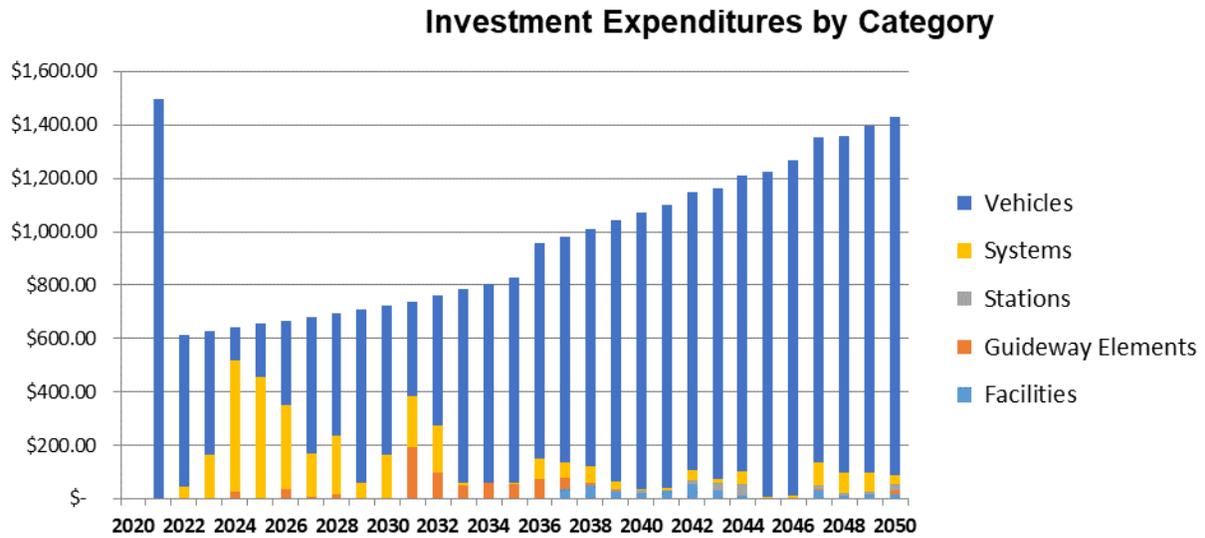
Figure 3. Annual backlog with committed funding only
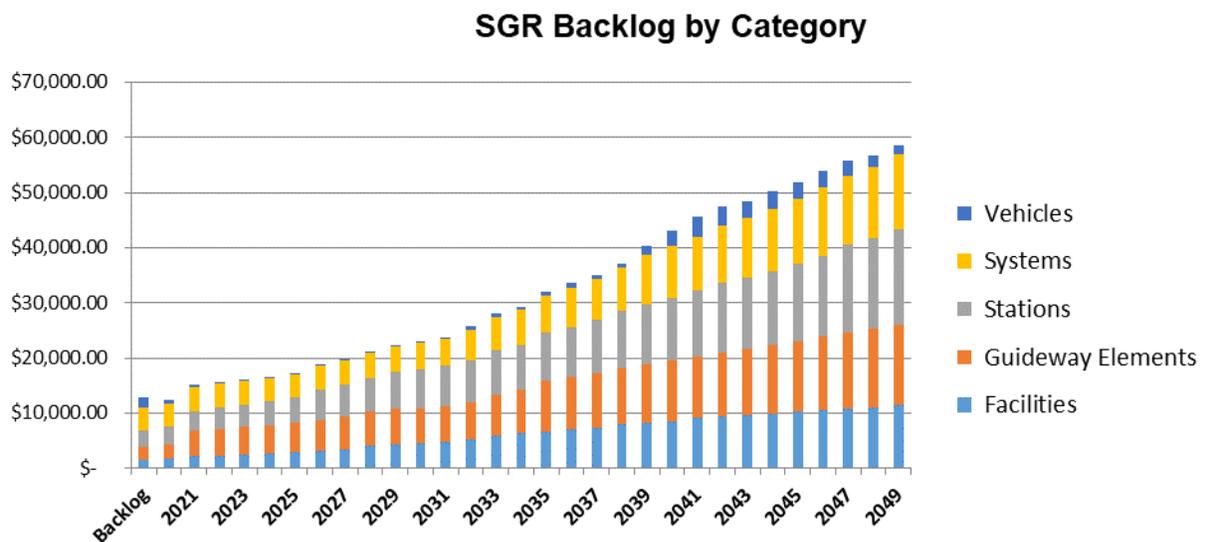
Figure 4. Annual investment assumed in the plan (discretionary and committed funding)

Investment Expenditures by Category

Legend: Vehicles, Systems, Stations, Guideway Elements, Facilities
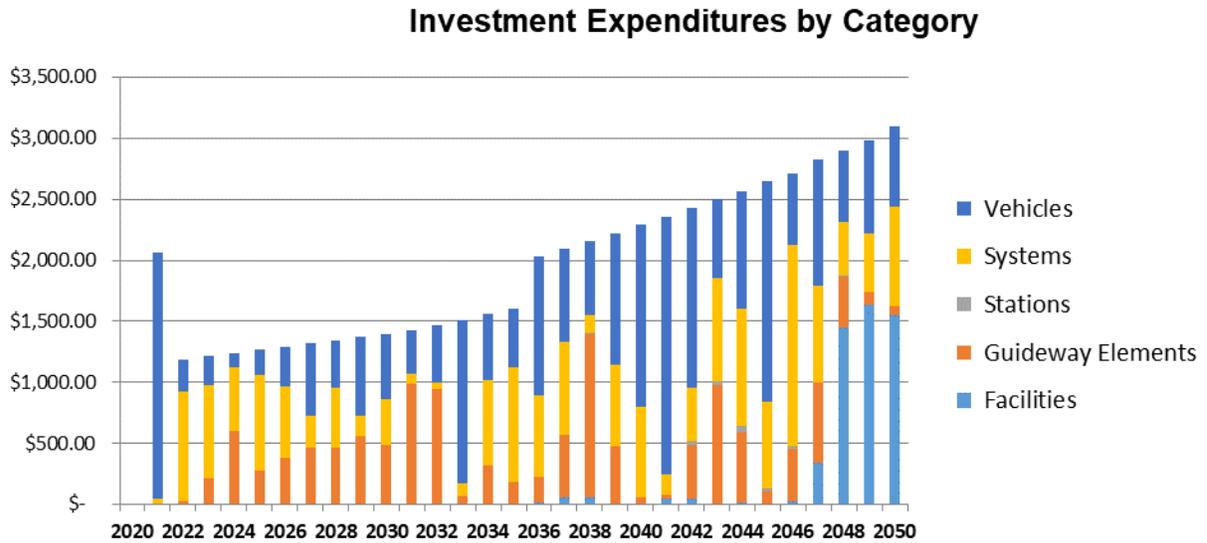
Figure 5. Annual backlog with plan investment (discretionary and committed funding)

SGR Backlog by Category

Legend: Vehicles, Systems, Stations, Guideway Elements, Facilities
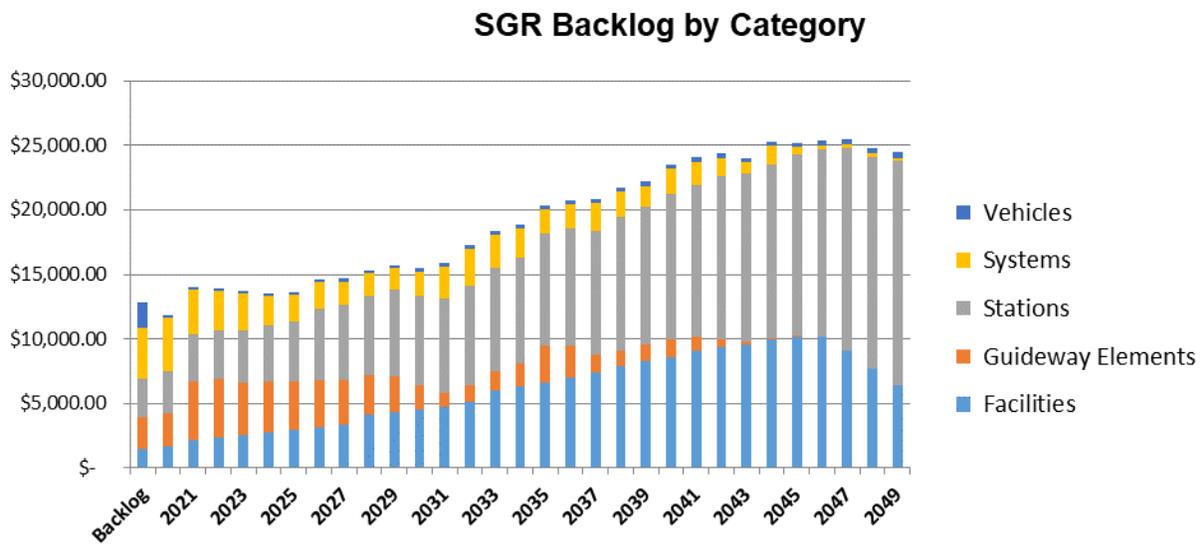
Aligning Funding with Strategies

The needs to operate and maintain the existing system of local streets and roads, highways, local bridges, regional bridges, transit assets and transit service described above form the foundation of the transportation element. The cost of these operations and maintenance activities is nested under Strategy T1: Operate and Maintain the Existing System. This is one of 12 strategies nested within the transportation element.

The core of the Plan Bay Area 2050 transportation element is a list of transportation projects and programs — organized across 12 strategies and three themes — that have been prioritized for implementation over the next 30 years with the expected revenues from federal, state, regional and local sources identified and included in the transportation revenue forecast. Plan Bay Area 2050's three transportation element themes are to maintain and optimize the existing system, create healthy and safe streets, and build a next-generation transit network. Included within the first theme is the strategy to operate and maintain the existing system, which represents the needs to operate and maintain the existing system of roads, highways, bridges and transit previously discussed in this report. The following section describes the requirements and approach for crafting the transportation element, provides more detail on the themes and their respective strategies, and discusses consistency with near-term regional funding documents.

All costs are reported in year-of-expenditure (YOE) — meaning cost estimates have been adjusted for inflation from the present time to the expected year of construction using a 2.2% assumed annual inflation rate, consistent with the rate used to estimate future revenues.

Requirements

The transportation element was prepared in accordance with the California Transportation Commission's RTP guidelines. Among many things, these guidelines require the inclusion of a fiscally constrained list of short-, medium-, and long-range transportation investments.

The California Air Resources Board (CARB) has requested that projects and program investments be fiscally constrained within two time periods, also referred to as bins, (2021-2035 and 2036-2050) to more closely align expenditures with forecasted revenues and to provide transparency in the sequencing of investments in order to achieve the SB 375 target for GHG emissions reductions in year 2035.

To address federal transportation-air quality conformity regulations, Plan Bay Area 2050 identifies two types of transportation project list entries, 1) group listings of projects exempt from regional air-quality conformity analysis (i.e., programmatic categories); and 2) non-exempt, capacity-increasing projects (i.e., regionally significant projects).

Generally, regionally significant projects are those that add travel lanes to freeways, expressways and highways or add new routes to fixed guideway transit facilities (e.g., rail, ferry, bus rapid transit). Group listings or programmatic categories do not alter transportation systems capacity and include investments such as general operations and maintenance, replacement, or preservation of system assets (e.g., pavement and transit vehicles), bicycle/pedestrian facilities, and intersection improvements. Regionally significant projects include project descriptions and corresponding cost estimates (both capital and operations costs when applicable), and an anticipated opening year, whereas the programmatic categories include general scopes and identify total investment.

Regionally significant projects must be included in the fiscally constrained transportation-air quality conformity determination to progress from an idea to implementation or construction. Therefore, Plan Bay Area 2050's transportation project list identifies the prioritized regionally significant projects and their estimated costs anticipated to open during the 30-year plan period that will seek federal, state or regional funding and/or those that will require federal or state actions (e.g., project-level transportation-air quality conformity, NEPA, CEQA).

Approach

Work on the transportation element began as part of the Horizon initiative, which evaluated the efficacy of strategies, as well as individual regionally significant transportation projects, through Futures Planning and the Project Performance Assessment initiatives. The revenue forecast and systems needs assessments identified available funding and funding gaps to operate, maintain, and preserve the existing transportation systems. The Call for Projects identified the remaining project and program proposals for consideration into the plan, along with their descriptions, cost estimates, and respective funding gaps. The Draft Blueprint evaluated a set of the highest-performing strategies, including a subset of high performing projects. The Final Blueprint then reconciled financial constraints with the full suite of strategies and refined the timing and inclusion of individual regionally significant projects within the strategies, concluding in a fiscally constrained list of projects and programs.

The fiscally constrained transportation project list includes a full range of investments, including projects that are subject to regional transportation-air quality conformity ("regionally significant") and those that are not. Generally, the investment in a regionally significant project is enough to fund all proposed phases of construction and operate the service (when applicable) over the entire plan period; however, to remain fiscally constrained, some regionally significant projects are included solely for planning or pre-construction phases, for one or more construction phases with independent utility, or as a pilot with a limited period of operations.

Soliciting Transportation Projects to Integrate into Plan Bay Area 2050 Strategies

MTC solicited project and program proposals through a collaborative process that allowed public agencies and members of the public to submit transportation project and program proposals for consideration into Plan Bay Area 2050's fiscally-constrained project list. In the first phase, occurring in summer 2018, CTAs and multi-county project sponsors were asked to update project assumptions (e.g., scope, cost, schedule) for major regionally significant projects included in Plan Bay Area 2040 (2017). Concurrent to this process, the region was challenged to submit project proposals to 'transform' the region through an open Request for Transformative Projects via the Horizon initiative. The open request focused on regionally significant projects that were estimated to cost more than $1 billion and were not previously submitted for consideration in Plan Bay Area 2040.

ln March 2019, MTC released the Request for Regionally Significant Projects guidance to CTAs and multi-county project sponsors seeking their assistance in identifying regionally significant transportation project proposals. Each of the nine Bay Area CTAs and multi-county project sponsors (e.g., Caltrans, BART, Caltrain) coordinated the identification and submittal of project proposals in their respective county or among their systems.

Major projects identified through these streams were then analyzed through the Project Performance Assessment process to evaluate their impacts on the region. The findings of this assessment were used to prioritize projects, as summarized later in this report and described at length in the Plan Bay Area 2050 Performance Report.

Finally, MTC asked each CTA to identify a fiscally constrained list of both regionally significant projects and programmatic category investments for inclusion in the transportation element of Plan Bay Area 2050. These lists included both major projects assessed through Project Performance Assessment and minor projects and programs that did not require project-level modeling. CTAs and multi-county sponsors were asked to share their initial list of transportation project and program proposals with members of the public before their respective boards endorsed and submitted their lists for consideration into Plan Bay Area 2050.

CTPs and Other Considerations

The region's countywide transportation plans represent robust local transportation planning efforts in the Bay Area. The plans, while voluntary, establish a county's long-range transportation vision, goals and priorities. Countywide transportation plans have an inter-dependent relationship with the long-range regional plan and provide a primary basis for projects and program proposals considered into the fiscally constrained project list. To facilitate this inter-dependent relationship, MTC prepares guidelines for counties who choose to prepare a countywide transportation plan. Among many things, MTC's guidelines encourage coordination and outreach while developing the countywide transportation plans. Countywide plans are closely related with self-help measure expenditure plans, which are approved by voters and

detail how transportation measures such as ¼-cent to 1-cent sales tax measures will be spent. Other sources of project and program proposals include, but are not limited to, modal studies (freight, transit, freeway, corridor, etc.), active transportation plans, community-based transportation plans and PDA investment and growth strategies.

Airport plans also informed the development of the Transportation Element. The Bay Area is home to four major passenger airports — Oakland International Airport, San Francisco International Airport, San Jose Mineta International Airport and Charles Schulz Sonoma County Airport — and a number of smaller general aviation airports. MTC works with Bay Area airports and the Federal Aviation Administration to plan and analyzed in the regional transportation-air quality conformity determination for future airport improvement projects through its regularly updated Regional Airport System Planning Analysis. While many airport development projects are not required to be included in the regional transportation plan, access improvements via highway or transit are included. Plan Bay Area 2050 improves access to the region's airports through projects such as the San Jose Airport People Mover and new express bus service between SFO International Airport and Vallejo via San Francisco. Additionally, the plan includes sea level rise protections that would mitigate inundation at low-lying airports like San Francisco and Oakland.

Scopes and Project Costs

Regionally significant project proposals for Plan Bay Area 2050 are required to include project descriptions (e.g., project scope, location, and purpose and need) and associated cost estimates represented in YOE dollars. Project descriptions and costs of regionally significant projects included in the plan and analyzed in the regional transportation-air quality conformity determination must be consistent with certified and approved environmental documents (i.e., CEQA and NEPA). The actual scopes and costs and other design details of most proposed long-range regionally significant projects are not known because the projects are in the early stages of planning; however, the project list includes the most recent planning assumptions for each project proposal.

Scopes and cost estimates were identified by CTAs and multi-county project sponsors during the Call for Projects process. Cost estimates included both capital and operations and maintenance costs, when applicable, and are reflected in YOE. If project cost estimates were available in current dollars, a 2.2% to 3% annual escalation rate was suggested for use to calculate YOE costs using the project's assumed midpoint of construction — calculated from the submitted construction start date and open-for-service date. Regionally significant transit projects that resulted in a net increase of new transit service hours included both capital and operations costs. Transit operations costs were quantified from the opening year through the duration of the plan period and assumed escalation in annual costs consistent with plan inflation rates (2.2%).

A cost audit was performed on the subset of regionally significant projects that underwent Project Performance Assessment. Costs were estimated using a uniform methodology that relied on work breakdown structure with per unit cost estimates for project components. The intention of the cost audit was to ensure project cost estimates used in the benefit cost analyses were consistent across all projects.

Strategy and Project Prioritization

Investments needed to maintain the existing transportation systems already consume a large share of the total future revenues, and the total estimated costs of project and program proposals far exceeded the forecasted revenues available over the 30-year plan period. Similarly, near-term (FY 2021-FY 2035) funding needs exceed the forecast for near-term funding. This means that trade-offs were required, weighing the appropriate strategies and investment levels. The trade-off process was collaborative and iterative, relying on technical analyses, input from partner agencies, public feedback and Commission direction.

There is more fiscal capacity in the second period (FY 2036-50) of the plan. Generally, this difference is a result of inflation, but it also is affected by the 2020 economic downturn's significant impacts on funding sources and the addition of new transportation revenues anticipated to begin in 2035. Thirty-five percent of the plan's revenues are in the first period. As such, the first period includes a limited set of investments, whereas the second period includes a larger number of regionally significant projects.

Transportation strategies, as well as individual regionally significant projects, were evaluated through both the Horizon and the Blueprint phases of plan development and prioritized for inclusion in Plan Bay Area 2050 based on their cost effectiveness and their ability to move the region toward its adopted vision of a more affordable, connected, diverse, healthy, and vibrant Bay Area for all, and to meet the SB 375 target for GHG emissions reductions. The region's most expensive projects also underwent a uniform project-level assessment to evaluate their alignment with plan objectives and goals, their cost-effectiveness, and their equity benefits/disbenefits.

In June 2020, the Commission was presented with recommendations of whether to "Include", "Consider", or "Exclude" the regionally significant projects that underwent the Project Performance Assessment from receiving regional discretionary dollars in the long-range plan. The recommendation also identified which period of the plan the project should be implemented. Recommendations were made on a project-by-project basis based on the project's performance outcomes and considered any applicable policy and funding commitments. In July 2020, the Commission took action to prioritize a subset of projects and programs for inclusion into the fiscally constrained project list by assigning "regional discretionary" funding on a project-by-project basis to close project funding gaps and ensure inclusion into the fiscally constrained project list. Recommendations were made based on several criteria, including Project Performance Assessment results (major projects only), the strength of modifications proposed in commitment letters (lower-performing major projects only), funding available to the project from county or other funding sources, and general alignment with Plan Bay Area 2050's strategies and adopted vision.

Several strategies were shaped by fiscally constrained county project lists. To ensure that the plan reflects local priorities, a portion of the transportation revenue forecasts was identified as county discretionary revenue. These county discretionary revenues are commonly referred to as the "county budget" or "county target." The budgets included forecasted revenues generated by county sales taxes and vehicle registration fees, a portion of state revenues generated by gas taxes and vehicle registration fees (RTIP and TFCA), and a portion of federal revenues generated by gas taxes (STBG and CMAQ programs as distributed through the One Bay Area Grant (OBAG) program). The County Budget assigned OBAG revenue to counties consistent with the OBAG 2 split for regional/county programs and used the OBAG 2 county shares for each county. RTIP funds were distributed based on each county's current STIP share, with existing STIP commitments reducing the amount included in the County Budget. CTAs also identified other unique locally generated transportation revenue sources to augment their County Budget. CTAs were then directed to constrain their county project lists to their respective budget. The July 2020 action to assign regional discretionary funding to specific projects and programs, described above, ultimately led to augmented county budgets that created additional fiscal constraint for local priorities.

Given the requirement that the transportation project list be fiscally constrained, not all projects considered for Plan Bay Area 2050 could be incorporated in the project list. Several projects are included in the list for their early phases (e.g., conceptual planning, environmental impact analyses, right-of-way acquisition and preliminary design), enabling initial work to continue. If these projects are to move forward, construction funding would need to be identified. Appendix 3 includes the list of these projects, as well as the unconstrained project list comprised of other transportation projects analyzed during Project Performance Assessment that ultimately were not included in Plan Bay Area 2050.

Strategy Costs

While the majority of the investments in the Plan Bay Area 2050 transportation element are sourced either from MTC's forecast of operations and maintenance needs and cost estimates submitted by project sponsors, the plan also includes a number of strategies crafted by MTC and ABAG staff to further support the attainment of the plan's vision. As a fiscally constrained list of investments, the transportation project list also includes placeholder costs representing the capital and operations funding needed to implement and operate these strategies. The following section documents the how the placeholder costs for these strategies were produced.

Maintain and Optimize the Existing System

The bulk of investments nested under this theme are directed toward the operations and maintenance of the existing transportation system, as described in detail above. Additionally, this theme also includes projects to improve interchanges and address highway bottlenecks and advance other regional programs and local priorities. These two strategies are comprised of similar projects and programs, and more information on their component costs can be found in the Plan Bay Area 2050 Transportation Project List.

Strategy T2: Support Community-Led Transportation Enhancements in Equity Priority Communities
A placeholder cost of $8 billion was included for this strategy, which would be used to implement transportation priorities identified by residents of Equity Priority Communities. This cost was derived by assuming roughly $200 million in today's dollars would be made available every year for equity-advancing projects, starting in 2025. This represents roughly 20 times the amount of funding per year that has been made available through MTC's Lifeline Transportation Program over the past two cycles.[6]

Strategy T3: Enable a Seamless Mobility Experience
A placeholder cost of $3 billion was included for this strategy, which could go toward investments such as a mobile app for traveler information, payments and trip planning. This funding is also envisioned to support capital improvements to smooth multi-operator or multimodal trips, such as wayfinding signage and improved transit stations.

Strategy T4: Reform Regional Transit Fare Policy
Plan Bay Area 2050 implements two reforms to regional transit fare policy. The first is to implement a regional distance-based fare and uniform local transit fares, replacing the patchwork of individual operator fare structures and discount systems. Analysis from Horizon suggested that fare integration alone could be revenue-neutral to operators, incentivizing enough new transit ridership to balance out any losses from the simplified fare system.

The strategy also envisions a 50% discount for riders with a household income of $50,000 or less in 2020 dollars. In order to keep transit operators whole and absorb the losses in fare revenue from this component of the strategy over the course of the plan period, the Transportation Project List includes $10 billion in regional transportation dollars for this strategy. This cost was calculated using transit fare collection outputs from Travel Model 1.5, allowing the cost to be based on simulated ridership levels by rider income category. The total fares collected from riders in the eligible income category between the No Project and Plan model simulations in 2050 was compared to get the estimated lost in transit fares from the means-based fare discount. This annualized figure was assumed to remain constant between the strategy's start in 2025 and the end of the planning period in 2050, with losses escalating each year at a 2.2% rate to account for inflation.

Strategy T5: Implement Per-Mile Tolling on Congested Freeways with Transit Alternatives
A placeholder cost of $1 billion was included for this strategy, which could go toward investments such as toll gantries, backend technological infrastructure to assess and collect tolls, and operational costs associated with collecting tolls. Discussion of the revenues projected to be generated by this strategy is included in the transportation revenue forecast section earlier in this document.

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6   The current cycle of Lifeline Transportation Program funding (Cycle 6) totals $7 million. The prior cycle made $11 million available in FY2017 and $12 million available in FY2018. More information is available on the MTC website here: https://mtc.ca.gov/planning/transportation/access-equity-mobility/lifeline-transportation-program.

Create Healthy and Safe Streets

CTAs anticipated billions of dollars in spending on projects that promote healthy and safe streets for all users over the next three decades. This includes county-identified investments in road diets, safety features, pedestrian crossing overpasses and other bicycle and pedestrian infrastructure. On top of those locally identified investments, Plan Bay Area 2050's transportation element includes additional investments that would promote higher rates of biking and walking and reduce fatalities and serious injuries.

Strategy T8: Build a Complete Streets Network

The Plan Bay Area 2050 Transportation Project List includes roughly $6 billion in projects and programs identified by CTAs that go toward the strategy to Build a Complete Streets Network. This investment is augmented by another $7 billion from a regional strategy to build more dedicated bike lanes and off-street trails and to improve the pedestrian experience through safer intersections and sidewalks.

Around $500 million of that funding is assumed to go toward the completion of the Bay Trail. This represents the construction of 200 new miles of planned multi-use paths at a cost of $2.2 million per mile.

For the Draft Blueprint, staff started with a goal of building 7,000 miles of new protected bike lanes or off-street multi-use paths. Using a cost estimation tool produced by the Alameda Transportation Commission, staff estimated the investment that would be required to reach this goal.[7]

From that resource, staff used the cost estimate of $300,000 per mile for a separated bikeway with soft hit posts, in 2019 dollars. While costs per mile for bicycle infrastructure will invariably change depending on the circumstances of the individual project, a single per-mile cost was used for simplicity.

Table 18. Cost estimate for regional investment in Complete Streets network (in millions of YOE$)

	COST PER MILE[8]	MILES BUILT	TOTAL COST
Protected Bike Lane Network			
2021-2035	$365,000	3,500	$1,300,000,000
2036-2050	$495,000	3,500	$1,700,000,000
Bay Trail Completion			
2021-2035	$2,200,000	200	$500,000,000
Total		7,200	**$3,500,000,000**

NOTE: This table does not include miles of bicycle infrastructure assumed to be built using county bike/pedestrian program investments

It is assumed that the remaining funding would support investments including secure bike parking at transit stations, pedestrian safety improvements and maintenance of the bicycle network.

While the Draft Blueprint only considered regional funding for bicycle infrastructure, the final Plan incorporated billions more dollars in county funds, bringing the estimated total increase in network miles to 10,000.

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7   Alameda County Transportation Commission. Active Transportation Program Cost Estimating Tool. Downloaded from https://www.alamedactc.org/wp-content/uploads/2019/05/CATP_Cost_Estimating_Tool_Final_20190531.xlsx.

8   The per-mile cost for Class IV protected bike lanes is converted to dollars representing the midpoint of the time period (i.e., the 2021-2035 per-mile cost is converted to 2028 dollars and the 2036-2050 cost is converted to 2043 dollars).

Strategy T9: Advance a Regional Vision Zero Policy Through Street Design and Reduced Speeds

Around $4 billion in funding is identified for transportation investments that would support the region's Vision Zero road safety goals. This includes $3 billion in funding identified by CTAs for safety-related uses, separate from funding attributed to the Build a Complete Streets Network strategy.

An additional $1 billion in regional investment in advancing a regional Vision Zero policy is included in addition to those county funds. This funding is reserved for investments that help to enforce lower speeds, such financial assistance for automated speed enforcement, driver education or traffic calming elements on local streets.

Build a Next-Generation Transit Network

Strategies that support the modernization and expansion of the regional transit network are comprised of individual projects and programs. Component costs can be found in the Plan Bay Area 2050 Transportation Project List.

Funding Summary

The proposed plan's transportation strategies detail how the region intends to invest the region's $572 billion in forecasted transportation revenues that would be generated over the next 30 years. These strategies continue the region's long-standing commitment to a "Fix-It-First" approach to maintain, optimize and restore the existing transportation system. Additionally, the transportation strategies are designed to create healthy and safe streets for pedestrians, cyclists, car drivers and transit users, and to build a next-generation transit network that is coordinated, consistent and convenient across the region.

The strategies were selected to move the region toward its adopted vision of a more affordable, connected, diverse, healthy and vibrant Bay Area for all, and to exceed the state-mandated target for GHG emissions reductions. This is generally accomplished by the strategies' ability to increase travel mode choices and accessibility, while reducing travel times and costs.

Fiscal Constraint

The transportation revenue forecast estimates that approximately $572 billion in revenues will be generated during the plan period (2021-2050) and available to transportation projects and programs. In addition to these revenues, some major projects and programs in the fiscally constrained transportation project list are committed (meaning the project has 100% of its funding plan secured and its environmental approvals) but are yet to open, while other projects and programs have partially secured funding plans through funding allocations or awards. These funding allocations are from funds generated before the plan period. As a result, roughly $19 billion augments the $572 billion revenue forecast and increases the total funding envelope to $591 billion.

Whereas the revenues and strategy costs for the housing and economy elements of Plan Bay Area 2050 are self-contained — housing revenues pay for housing strategies, etc. — there is a connection between the transportation and environment elements of the plan. This is due to the fact that a handful of transportation investments are nested within environment strategies.

Included in the $591 billion are $13 billion in revenues generated from increased parking pricing, brought about by the environment element strategy titled Expand Transportation Demand Management Initiatives. With parking pricing envisioned to begin in 2035, the bulk of these revenues are transferred to the transportation element and allocated to transportation strategies in the latter half of the plan.

In turn, $13 billion in forecasted transportation revenues are directed toward strategies listed in the environment element of Plan Bay Area 2050, which have a strong transportation nexus. These funds are assigned to strategies that increase adoption of electric vehicles (Strategy EN8) and support expanded transportation demand management initiatives (Strategy EN9), two high-impact strategies for GHG emissions reductions. Additionally, some transportation funds are directed at the strategy Adapt to Sea Level Rise to support adaptation measures on the State Route 37 corridor.

A summary of the plan's transportation investments by theme and strategy is shown in Table 19.

Table 19. Plan Bay Area 2050 transportation investment summary

THEME	STRATEGY	TOTAL PLAN INVESTMENT
TRANSPORTATION ELEMENT		
Maintain and Optimize the Existing System	T1. Restore, Operate and Maintain the Existing System	$389 billion
	T2. Support Community-Led Transportation Enhancements in Equity Priority Communities	$8 billion
	T3. Enable a Seamless Mobility Experience	$3 billion
	T4. Reform Regional Fare Policy	$10 billion
	T5. Implement Per-Mile Tolling on Congested Freeways with Transit Alternatives	$1 billion
	T6. Improve Interchanges and Address Highway Bottlenecks	$12 billion
	T7. Advance Other Regional Programs and Local Priorities	$17 billion
Create Healthy and Safe Streets	T8. Build A Complete Streets Network	$13 billion
	T9. Advance Regional Vision Zero Policy through Street Design and Reduced Speeds	$4 billion
Build a Next-Generation Transit Network	T10. Enhance Local Transit Frequency, Capacity, and Reliability	$32 billion
	T11. Expand and Modernize the Regional Rail Network	$81 billion
	T12. Build an Integrated Regional Express Lanes and Express Bus Network	$9 billion
	SUBTOTAL	**$578 billion**
ENVIRONMENT ELEMENT		
Reduce Risks from Hazards	EN1. Adapt to Sea Level Rise *(subset; direct-nexus transportation investments only)*	$7 billion
Reduce Climate Emissions	EN8. Expand Clean Vehicle Initiatives	$5 billion
	EN 9. Expand Transportation Demand Management Initiatives	$1 billion
	SUBTOTAL	**$13 billion**
	GRAND TOTAL	**$591 billion**

Maintain and Optimize the Existing System | $441 Billion | 75%

Just under three-fourths of the proposed plan's transportation revenues are reinvested toward maintaining and optimizing the existing transportation system. Nearly two-thirds of the forecasted transportation revenues are dedicated to maintaining existing roads, bridges and transit vehicles, and to providing transit service. Included within this theme as well is funding that would accelerate the restoration of transit service hours to 2019 levels within the first half of the planning time frame.

On transit, the proposed plan is designed to promote a seamless mobility experience, meaning travel options are convenient and easy to understand. It proposes standardizing transit fares across the region's 27 transit operators, with one local fare across all operators and free transfers between local routes. Additionally, the plan envisions a regional means-based discounted fare program to reduce the cost burden for the lowest income residents.

For roadways, the plan includes a limited selection of roadway widenings, local road extensions to serve new developments, and interchange redesigns that improve safety and operations. In order to address congestion over the next three decades, the plan proposes implementing per-mile tolling on select congested freeways with transit alternatives, with a means-based discount for households earning below the regional median income. An estimated $25 billion in funding could be generated between 2030 and 2050, helping to fund transit investments proposed for the latter years of the proposed plan.

Optimization of existing road and transit infrastructure is critical to the meeting the plan's goals. On transit, this includes investments in bus only lanes, transit signal priority, grade separations and upgrades to train control and communications tools. On the road network, planned investments in the Bay Area Forward program build toward a regional intelligent transportation systems infrastructure, envisioning a menu of optimization approaches that includes adaptive ramp metering, bus on shoulder, optimized corridor management, arterial signal timing and traffic signal upgrades, and more.

Below are the proposed plan strategies to maintain and optimize the Bay Area's existing transportation system:

- **T1. Restore, Operate and Maintain the Existing System** | Commit to operate and maintain the Bay Area's roads and transit infrastructure while reversing pandemic-related cuts to total transit service hours.

- **T2. Support Community-Led Transportation Enhancements in Equity Priority Communities** | Provide direct funding to historically marginalized communities to fund locally identified transportation needs.

- **T3. Enable a Seamless Mobility Experience** | Eliminate barriers to multi-operator transit trips by streamlining fare payment and trip planning while requiring schedule coordination at timed transfer hubs.

- **T4. Reform Regional Transit Fare Policy** | Streamline fare payment and replace existing operator- specific discounted fare programs with an integrated fare structure across all transit operators.

- **T5. Implement Per-Mile Tolling on Congested Freeways with Transit Alternatives** | Apply a per-mile charge on auto travel on select congested freeway corridors where transit alternatives exist, with discounts for carpoolers, low-income residents, and off-peak travel; and reinvest excess revenues into transit alternatives in the corridor.

- **T6. Improve Interchanges and Address Highway Bottlenecks** | Rebuild interchanges and widen key highway bottlenecks to achieve short- to medium-term congestion relief.

- **T7. Advance Other Regional Programs and Local Priorities** | Fund regional programs like motorist aid and 511 while supporting local transportation investments on arterials and local streets.

Create Healthy and Safe Streets | $17 Billion | 3%

The second major theme of the transportation element is the creation of healthy and safe streets. Active modes are particularly important for local trips like shopping at nearby businesses and for recreation, as well as for accessing transit for longer-distance trips. Active transportation benefits both public health, through increased physical activity, and the environment, through zero-emissions travel.

The proposed plan lays the course for $13 billion invested in pedestrian and bicycle facilities, including an estimated 10,000 miles of new protected bike lanes and off-street trails. This expansive investment in bicycle infrastructure would make the Bay Area's streets welcoming to cyclists of all ages and abilities, building off of recent upticks in cycling on car-free slow streets throughout 2020 and 2021. Other amenities for cyclists, pedestrians and rollers include secure bike parking at transit stations, pedestrian lighting and intersection safety improvements.

The investments in the proposed plan seek to make the region's transportation system safer, in line with the regional Vision Zero policy that was adopted by the Commission in 2020. The proposed plan includes context-specific speed limit reductions regionwide. In order to enforce these slower speeds equitably and cost-effectively, the proposed plan includes billions of dollars in traffic calming elements like speed bumps and road diets that would naturally encourage lower vehicular speeds.

Below are the proposed plan strategies to create healthy and safe Bay Area streets:

- **T8. Build a Complete Streets Network** | Enhance streets to promote walking, biking and other micro-mobility through sidewalk improvements, car-free slow streets, and 10,000 miles of bike lanes or multi-use paths.

- **T9. Advance Regional Vision Zero Policy through Street Design and Reduced Speeds** | Reduce speed limits to between 20 and 35 miles per hour on local streets and 55 miles per hour on freeways, relying on design elements on local streets and automated speed enforcement on freeways.

Build a Next Generation Transit Network | $122 Billion | 21%

The proposed plan dedicates over $30 billion over the next 30 years to expanding local transit, increasing its frequency and installing infrastructure that enables local transit to operate faster, more reliably, and under less crowded conditions. The proposed plan also envisions an enhanced regional rail network, with a set of investments totaling over $80 billion that put the Bay Area on the path toward a world-class rail system. The anchor of a plan for rail in the Bay Area, looking out over the next three decades, is the Link21 new transbay rail crossing connecting downtown Oakland and San Francisco. The proposed plan also invests in projects and programs to increase the frequencies of the region's current rail systems or fill in gaps in the network.

While the proposed plan identifies sufficient housing growth to not result in a net increase in in-commuters, or people that live outside the nine-county Bay Area but commute in each day to work, planned investments would respond to the challenges presented by existing in-commute levels. For those commuting into the region from the south, the proposed plan includes investments that lay the foundation for the arrival of California High Speed Rail in the region. In-commuters from the east would see improved express bus connections from SolTrans, more frequent service on the Altamont Corridor Express and a new rail connection between San Joaquin County and the Dublin/Pleasanton BART station through Valley Link.

The proposed plan recognizes the need for a flexible, multimodal transportation system and plans for a robust regional express bus service plan that complements regional rail and local transit. Investments in express buses, which are paired with an investment to build out the Bay Area Express Lanes Network, ensure that express bus service is time-competitive with driving while also providing drivers with an option to bypass congestion by paying an added toll.

Below are the proposed plan strategies to build the Bay Area's next generation transit network:

- **T10. Enhance Local Transit Frequency, Capacity and Reliability** | Improve the quality and availability of local bus and light rail service, with new bus rapid transit lines, South Bay light rail extensions, and frequency increases focused in lower-income communities.

- **T11. Expand and Modernize the Regional Rail Network** | Better connect communities while increasing frequencies by advancing a new transbay rail crossing, BART to Silicon Valley Phase 2, Valley Link, Caltrain Downtown Rail Extension and Caltrain/High-Speed Rail Grade Separations, among other projects.

- **T12. Build an Integrated Regional Express Lanes and Express Bus Network** | Complete the buildout of the regional express lanes network to provide uncongested freeway lanes for expanded express bus services, carpools and toll-paying solo drivers.

Reduce Risks from Hazards | $7 Billion | 1%

While the themes Reduce Risks from Hazards and Reduce Climate Emissions sit within the environment element of Plan Bay Area 2050, they both rely on transportation revenues and thus are part of the fiscally constrained RTP. The costs associated with these two themes are shown here for clarity.

The proposed plan's environmental strategies promote conservation, adaptation, and climate mitigation. Strategies that fall under the four themes of expanding access to parks and open space; protecting high-value conservation lands; reducing climate emissions; and reducing risks from hazards are crucial to ensuring that the Bay Area is environmentally — and equitably — thriving in 2050.

The strategies were selected to move the region toward its adopted vision of a more affordable, connected, diverse, healthy and vibrant Bay Area for all, and to exceed the state-mandated target for GHG emissions reductions. This is generally accomplished by the strategies' ability to protect from sea level rise, shape the region's forecasted land pattern and focus growth (housing and jobs) away from hazards and reduce GHG emissions.

By 2050, according to many climate scientists, major U.S. cities, including San Francisco, will have unprecedented weather events. Wildfires that destroy hundreds of homes in a single night are becoming an annual occurrence, and traffic is routinely rerouted on several low-lying roads due to flooding from heavy rains. The threat of a major earthquake has always existed in the Bay Area, and with the last major seismic event in the region occurring in 1989 with the Loma Prieta earthquake, the region is due for another major event, based on scientific forecasts.

There is considerable uncertainty as to how natural hazards will shape life in the Bay Area over the next 30 years and beyond. The proposed plan takes these risks into account, discouraging growth in high-risk wildfire areas; planning to protect homes, businesses, and transportation infrastructure from flooding; and considering avenues to minimize damage from a major earthquake.

While the total need for the strategy Adapt to Sea Level Rise is estimated to be $19 billion, staff have identified the adaptation measures that have a specific nexus with transportation infrastructure. Transportation revenues are then dedicated to that subset of projects, protecting transportation corridors including I-580/SMART in Marin County; I-880 in Alameda County; SR-237/VTA Orange Line in Santa Clara County; SR-37 in Marin, Sonoma, Napa and Solano counties; SR-84 in Alameda County; and US-101 in Marin and San Mateo counties.

Below are the proposed plan strategies to reduce risks from hazards:

- **EN1. Adapt to Sea Level Rise** | Protect shoreline communities affected by sea level rise, prioritizing low-cost, high-benefit solutions and providing additional support to vulnerable populations.

Reduce Climate Emissions | $5 Billion | 1%

The importance of addressing climate change in the face of ever-worsening climate events like fires, drought, extreme heat, and flooding calls for a swift and sustained reduction in GHG emissions across multiple sectors. Senate Bill 375, a state mandate to reduce GHG emissions from transportation, codified this importance in 2008, calling on regions across the state to work together toward the goal of reducing global warming and combating climate change.

Strategies recognize that action is needed at a variety of scales and on different timelines. For individuals, policies that encourage more sustainable transportation choices and promote access to zero-emissions vehicles are critical. Employers contribute by compelling their employees to commute sustainably through a menu of incentives and disincentives. Outside the realm of transportation, buildings are retrofitted to be more efficient and emit less pollution. Together, these strategies reduce the Bay Area's climate emissions, exceeding state-mandated targets without sacrificing equitable outcomes.

While many proposed plan strategies across the transportation, housing and economy chapters help to reduce climate emissions, below are the proposed plan strategies to reduce climate emissions included in the environment chapter:

- **EN7. Expand Commute Trip Reduction Programs at Major Employers** | Set a sustainable commute target for major employers as part of an expanded Bay Area Commuter Benefits Program, with employers responsible for funding incentives and disincentives to shift auto commuters to any combination of telecommuting, transit, walking and/or bicycling.

- **EN8. Expand Clean Vehicle Initiatives** | Expand investments in clean vehicles, including more fuel-efficient vehicles and electric vehicle subsidies and chargers.

- **EN9. Expand Transportation Demand Management Initiatives** | Expand investments in programs like vanpools, bikeshare, carshare and parking fees to discourage solo driving.

Consistency with Near-Term Programming Documents

The Transportation Improvement Program (TIP) lists the near-term transportation projects and program investment priorities of the region's surface transportation system that have a federal interest — meaning projects or programs for which federal funds or actions by federal agencies are anticipated — along with regionally significant local and state-funded projects.[9] The TIP signifies the start of implementation of the projects and programs outlined in Plan Bay Area 2050. It does this by identifying specific projects and programs over a four-year time frame that will help move the region toward its transportation vision that are consistent with the fiscally constrained project list. Locally funded transit operations and pavement maintenance are generally not included in the TIP.

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9   See the TIP webpage for more information: https://mtc.ca.gov/funding/transportation-improvement-program-tip.

Chapter 3 | Technical Assumptions for the Environment Element

Introduction

Plan Bay Area 2050 is more comprehensive than past regional plans. For the first time it considers the financial needs and revenues beyond transportation, including those for the environment. As a preliminary approach to integrate the environment, Plan Bay Area 2050 looked at making the region both more resilient and more equitable. This assessment focused on resilience, including specific climate adaptation (near-term sea level rise) and hazard mitigation (residential seismic and wildfire safety) approaches, as well as on conservation and access to open space.

This narrower scope focuses on resilience challenges that blend well with other land use, transportation and housing policy efforts included in Plan Bay Area 2050. Other resilience challenges will require significant investments (e.g., drought and extreme heat adaptation) but they remain outside the scope of Plan Bay Area 2050. Plan Bay Area 2050 builds off the extensive analysis of the Horizon effort, which tested a suite of strategies through a series of uncertain futures. For the first time, resilient strategies, such as adapting to near-term sea level rise, were included in this effort.

This section discusses the financial assumptions of the Plan Bay Area 2050 Environment Needs and Revenue analysis. It analyzes the needs and revenue for 2021-2050, which have been developed in consultation with stakeholders and subject matter experts. Present-day revenues to fund parks maintenance and expansion are not documented due to incomplete publicly available information, meaning that existing revenues for the environment element are undercounted.

Environment Revenue Forecast

Existing Environment Revenues

Sea Level Rise Adaptation Revenues
Using collected information on known funding sources, existing adaptation-eligible funding sources are estimated to generate approximately $3.031 billion for the Bay Area through the year 2050. This estimate accounts for historic levels of local, regional, state, and federal revenue sources. Annual revenue sources are then projected into the future using a set of assumptions. Sources gathered for this report were only included if they could be used for coastal flood mitigation, and the revenue sources include all types of sea level rise adaptation and protection, including grey and green infrastructure types. However, it is recognized that some revenue sources are not dedicated explicitly to sea level rise inundation. There are many competing needs for flood mitigation revenues, and some fund sources may be used for drainage, riverine flooding or other types of inundation needs.

LOCAL
Local revenues include special taxes that have expiration dates within the planning period. The San Mateo Drainage Tax has no expiration date, and it was therefore assumed to exist through the life of the plan. In this analysis, the availability of local bond funds was not able to be determined, aside from two projects: the bond for the Foster City levees, and the funding being raised by SFO for its protective seawall. These projects were clustered with other known project funding and designated in the table below as Projects Under Construction.

REGIONAL
A substantial source of expected revenue will come from Measure AA, a regional measure passed in 2016 to help protect and restore the Bay. Although its timeline does not extend the full length of the planning period,[10] its funds, at $520 million in projected revenue, will act as a critical element to help the region combat sea level rise. The number used in this analysis may vary from some assessments of Measure AA to match the methodology of calculating inflation in Plan Bay Area 2050.

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10   The tax is scheduled to expire in 2036.

STATE

State revenues for sea level rise are assumed to come from uncommitted funds generated through state water bonds. Due to staff constraints, detail at a project level was not available. The available state bond funds were adjusted with the assumption that the Bay Area will only receive roughly 20% of funding, which is proportional to its share of the state population. Other state sources, including allocations from the state General Fund, could also be made available for sea level rise adaptation at the local or regional levels. However, finalized values for individual regions from the 2021-2022 state budget were not available for the Needs and Revenue analysis.

FEDERAL

US Army Corps of Engineers funds constitute most of the federal element, as the Army Corps has been involved in much of the region's flood protection efforts. Analysis on USACE investments assumed that those marked as navigation expenses do not relate to sea level rise, and thus those funds are not included in the total. Additionally, financial support from FEMA has been a consistent source of revenue for the region for decades, and this trend is expected to continue. For USACE funds, revenues were averaged from 2010, and projected outwards. For FEMA, flood-related revenues were averaged from 1995 onwards, and then projected, accounting for both increased yearly variance and the amount of available data. For this analysis, due to staff and data constraints, many other data sources were not included as potential revenue, including possible revenue from the Environmental Protection Agency, and other federal agencies.

Table 20. Sea level rise revenue summary (in millions of YOE$)

SCALE	MEASURE	CALCULATION YEAR[11]	ANNUAL VALUE	INFLATION	TOTAL (2021-2050)
Local	San Mateo Drainage Tax	2019	$3	2.2%	$134
	Projects Under Construction	2019	N/A	2.2%	$1,126
Regional	Measure AA	2016	$25	2.2%	$520
State	State Bond: Prop 68 (2018)	N/A	N/A	N/A	$56
	State Bond: Prop 1 (2014)	N/A	N/A	N/A	$52
	State Bond: Prop 84 (2006)	N/A	N/A	N/A	$14
	State Bond: Prop 1E (2006)	N/A	N/A	N/A	$25
Federal	FEMA Grants	1995-2019	$2	2.2%	$78
	USACE Investments	2010-2019	$23	2.2%	$1,026
Total					**$3,031**

11 Year(s) upon which the annual value is based.

Residential and Commercial Property Retrofit Revenues

In Plan Bay Area 2050, existing revenue was only analyzed for residential seismic mitigation. No existing revenue was analyzed for residential safety for wildfire and other hazards. Existing seismic mitigation revenues were only included if they could protect residential structures. No existing funding to support retrofits on public or commercial buildings was considered.

The Bay Area has seen small residential seismic mitigation funding from all scales of government, and this trend is expected to continue into the future. It is estimated that the region will raise $253 million in revenue to address residential seismic mitigation

LOCAL

Many municipalities have issued seismic bonds to protect schools and infrastructure, and the city of Hayward has even produced a seismic tax to retrofit the entirety of their public structures. While there has not been a local funding source identified that provides direct financial incentives for residential structures, the City of Berkeley utilizes a transfer tax to assist with seismic mitigation. Berkeley residents who purchase a home can recoup one-third of their transfer tax if the funds are used for a seismic retrofit.[12]

REGIONAL

There is no known regional revenue source for residential mitigation.

STATE

At the state level, it is expected that the California Earthquake Authority (CEA) will continue to fund seismic retrofits within the region. CEA retrofits cover either 5% of investment income on CEA's invested funds, or $5 million, whichever is less. This assessment assumes the CEA invests $5 million. Also, the funds cover the entire state – therefore, as with other state initiatives in this analysis, it is assumed that the Bay Area receives 20% of state funding, proportional to its share of the population.

FEDERAL

The federal government is predicted to provide a reliable revenue source through FEMA. Historic FEMA support has been reliable to the region, at an average annual value of $6 million for seismic mitigation since 1995. However, the Building Resilient Infrastructure and Communities (BRIC) program, introduced in 2020, is anticipated to give the region a percentage of annual disaster funds, which is anticipated to replace pre-disaster mitigation grants. The initial estimate of this program is approximately $5 million annually for seismic mitigation.

Table 21. Seismic mitigation revenue (in millions of $YOE)

SCALE	MEASURE	ANNUAL VALUE	INFLATION	TOTAL (2021-2050)
State	CEA Home Retrofits	$1	2.2%	$43
Federal	FEMA (BRIC)	$5	2.2%	$209
Total				**$253**

Transportation Revenues Directed Toward Environment Strategies

The fiscally-constrained transportation project list includes $13 billion in investments that are directed toward strategies in the Environment Element with a strong transportation nexus. In particular, strategies EN8: Expand Clean Vehicle Initiatives and EN9: Expand Transportation Demand Management Initiatives are completely funded with transportation revenues. A share of the total cost of strategy EN1: Adapt to Sea Level Rise is also covered by transportation revenues. These transportation revenues are existing revenues that are reasonably expected to accrue to the Bay Area based on historic receipts.

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12 City of Berkeley. Real Property Transfer Tax. https://www.cityofberkeley.info/Finance/Home/Real_Property__Transfer_Tax_Seismic_ Refunds.aspx.

COVID-19 Impacts on Environment Revenues

Resilience revenue is not expected to be heavily affected by the economic impacts of COVID-19. Federal funding assumptions are based on historic regional receipts, accounting for past recessions, and state bonds and planned sea level rise adaptation projects already have committed financing. One source may be affected, however — the local San Mateo drainage tax, currently without a sunset date, may sunset earlier within the plan period. This change, if it occurs, could reduce revenue by up to 4% over the life of the plan.

New Revenues for Environment Strategies

New Revenues for Sea Level Rise

The Plan Bay Area 2050 Sea Level Rise Needs and Revenue Assessment estimates that the Bay Area can expect roughly $3 billion in future revenues to address sea level rise adaptation from a known suite of local, regional, state, and federal sources. The fiscal need to address the projected inundation impacts is $19.3 billion, creating a $15.9 billion dollar funding gap.13 MTC staff have crafted a version 1.0 sea level rise adaptation funding strategy with the help of sea level rise stakeholders. Work to refine this strategy will continue after the adoption of Plan Bay Area 2050.

In total, 217 unique adaptation strategies are imagined, ringing the bay and protecting transportation assets, vulnerable communities, growth areas and the environment. Funding is expected to come from a variety of sources based on what floods, with specific resources dedicated to reducing the financial burden on historically underserved communities. While dozens of different funding tools exist, at this point four general funding categories are envisioned to raise $15.9 billion.

A regional parcel tax could build off the existing Measure AA parcel tax, which will generate $500 million through 2036. A larger and longer lasting parcel tax could contribute funding to a suite of regionally significant project elements. A parcel tax of $90, for example, could raise $4.9 billion in revenue over the life of the plan (2021-2050). Such a tax could help support both environmental and community protections.

Community protection could also be funded by a combination of assessment districts and business gross receipts taxes. Special assessment districts could take place at varying scales across the region. Staff anticipate that such districts may be expected to provide $3 billion dollars by 2050. The assessment would be applied based on the flooding risk of properties and their assessed value. Further analysis is needed to understand the appropriate scales of such a funding strategy, particularly with regards to advancing equity. A business gross receipts tax is also envisioned as a potential progressive tax measure that could be used to support adaptation in disadvantaged communities in the region.

It is envisioned that transportation projects would be funded in large part by transportation fund sources. Major projects, particularly those that may elevate structures such as SR-37, may be supported by tolling. Existing transportation fund sources can be amended to allow that funding be allocated for adaptation action that provide benefits to transportation infrastructure.

This funding proposal is built on many assumptions. Chiefly, it does not account for new forms of state or federal support, which could significantly reduce the overall funding burden on the region. New revenue sources for resilience investments are currently being discussed at both the state and federal levels, though information on the form or amount of these new revenues was not yet available at the time that resilience Needs and Revenue estimates were prepared for Plan Bay Area 2050. Staff is expected to do further analysis on a sea level rise funding plan in the future to determine what funding measures, and at what scale, should be pursued to advance equitable sea level rise adaptation in the region.

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13 Draft Needs and Revenue Assessment (2019) Sea Level Rise Needs and Revenue Assessment. Joint MTC Planning and ABAG Administrative Committee. December 13, 2019.

New Revenues for Other Hazards

While the CEA is expected to continue its seismic retrofit grants, forecasted to generate $43 million for the Bay Area, it is suggested that the state role be expanded to produce more revenue, in particular for low-income households. The current Brace and Bolt program from CEA offers $3,000 grants to households, which is restrictive for those who cannot raise the rest of the funding.14 If the state enacted new legislation for a low income retrofit program, the Bay Area could receive a portion of that funding proportional to its population. A bill such as SB254,15 while currently stalled, could help provide a portion of this funding.

Another potential option for mitigation funding is to create a regional transfer tax, which could help to fund residential building mitigation across the region. A series of high-level assumptions were made to estimate the potential fundraising ability of such a task. Analysis based on contemporary home sale values assumed a transfer tax of $5,200 per property, escalated through the life of the plan, which an average of 62,000 properties would pay annually. Further analysis on such a revenue source would be needed to assure it would be equitably collected and distributed.

Table 22. Potential new revenues for the modernize existing residential buildings strategy (in millions of YOE$)

SCALE	MEASURE	ANNUAL VALUE	INFLATION	TOTAL (2021-2050)
State	CEA SB254	$15-20	2.2%	$700
Federal	Aggregate Transfer Tax Collected	$3,375	2.2%	$13,500
Total				$14,200

New Revenues for Conservation

Funding streams exist to support ongoing maintenance and capital enhancements at local, regional and state parks throughout the region. However, as publicly available information on the amount of funding available for these purposes is incomplete, a revenue analysis for conservation funding was not feasible. As such, no existing revenues for conservation purposes are considered, meaning that the total revenues available for the environmental strategies are undercounted.

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14 California Earthquake Authority. Brace and Bolt Grants. https://www.earthquakeauthority.com/California-Earthquake-Insurance-Policies/Earthquake-Insurance-Policy-Premium-Discounts/Brace-and-Bolt-Seismic-Retrofit-Grants

15 Legislation would alter insurance to reduce re-insurance costs, with savings of $75-100M annually to go into seismic mitigation across the state. http://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=201920200SB254.

Table 23. Summary of revenues for Environment Element (in millions of YOE$)

REVENUE SOURCE	PLAN BAY AREA 2050 TOTAL REVENUE
FEDERAL	
FEMA Grants (Flooding)	$78
U.S. Army Corps of Engineers (USACE) Investments	$1,026
FEMA Building Resilient Infrastructure and Communities Grants	$209
Federal Total	**$1,313**
STATE	
State Bond: Prop 68 (2018)	$56
State Bond: Prop 1 (2014)	$52
State Bond: Prop 84 (2006)	$14
State Bond: Prop 1E (2006)	$25
CEA Home Retrofits	$43
State Total	**$190**
REGIONAL	
Measure AA	$520
Regional Total	**$520**
LOCAL	
San Mateo Drainage Tax	$134
Sea Level Rise Mitigation Projects Under Construction	$1,126
Local Total	**$1,260**
TRANSPORTATION SOURCES	
Existing Transportation Revenues	$13,170
Transportation Sources Total	**$13,170**
NEW REVENUES	
New Revenues	$86,700
New Revenues Total	**$86,700**
GRAND TOTAL	**$103,153**

Strategy Costs

Reduce Risks from Hazards

Plan Bay Area 2050's strategies address three themes related to natural hazards: sea level rise, resilience of residential buildings, and resilience of commercial or public buildings. Previous iterations of Plan Bay Area acknowledged sea level rise as an environmental challenge. Plan Bay Area 2050 has integrated this issue area directly into the plan itself with a strategy to adapt communities and infrastructure from rising tides. Strategy EN1: Adapt to Sea Level Rise envisions a tailored set of natural and humanmade mitigation measures that protect most vulnerable communities and transportation assets from permanent inundation.

A major earthquake on one of the Bay Area's many faults could damage over 100,000 homes in a matter of seconds, adding an acute housing crisis to the region's chronic one. In recent years, fires have devastated the region, showing how many homes are vulnerable to risk across the region. Analysis for EN2: Provide Means-Based Financial Support to Retrofit Existing Residential Buildings and EN3: Fund Energy Upgrades to Enable Carbon Neutrality in All Existing and Public Buildings shows that with a lack of historical funding for residential and commercial retrofits, there is critical unmet need for mitigation for all types of buildings.

Strategy EN1: Adapt to Sea Level Rise

To estimate the cost of this strategy, areas with near-term sea level rise exposure were identified, and cost estimates for generic adaptation options were applied. As a first effort to quantify regional sea level rise adaptation needs and their costs, this strategy focuses on needs that arise from near-term sea level rise inundation. Regional data was not available to analyze the relationship of sea level rise inundation to other types of flooding, such as from groundwater or stormwater. Future analysis will seek to incorporate the best available information and climate science on multiple forms of flooding for the Bay Area.

HEIGHT OF SEA LEVEL RISE
Plan Bay Area 2050 builds off the flood prediction guidance of both the state and regional agencies. The plan integrates the work of the California Ocean Protection Council (OPC), which lays out a series of projections that incorporate both variations in risk, as well as in future emissions rates. This guidance was further endorsed by colleagues at the San Francisco Bay Conservation and Development Commission (BCDC), leading to adopted projection rates for the Horizon initiative.[16]

Table 24. California Ocean Protection Council sea level rise projections

	PROBABILISTIC PROJECTIONS (IN FEET) (BASED ON KOPP ET AL. 2014)				H++ SCENARIO (SWEET ET AL. 2017 *SINGLE SCENARIO)
	MEDIAN	**LIKELY RANGE**	**1-IN-20 CHANCE**	**1-IN-200 CHANCE**	
	50% probability sea level rise meets or exceeds…	66% probability sea level rise is between…	5% probability sea level rise meets or exceeds…	0.5% probability sea level rise meets or exceeds…	
			Low risk aversion		Medium-high risk aversion	Extreme risk aversion
2030	0.4	0.3	0.5	0.6	0.8	1.0
2040	0.6	0.5	0.8	1.0	1.3	1.8
2050	0.9	0.6	1.1	1.4	1.9	2.7

16   MTC, Plan Bay Area 2050 and Sea Level Rise, September 2020, https://www.planbayarea.org/document/pba2050slrbrief102120finalpdf-0.

Plan Bay Area 2050 assumes two feet of permanent inundation and one foot of additional temporary inundation from annual king tides and storms.

Two feet of permanent inundation was chosen based on the best available guidance from the California Ocean Protection Council (OPC).[17] As noted in Table 24, the range in predictions for 2050 varies greatly. Communities with low risk aversion could look at the likely range of inundation, where OPC determines a 66% of 1.1 feet. However, communities with medium to high risk aversion are recommended to expect 1.9 feet of inundation, at 0.5% probability. The most extreme risk aversion prediction is 2.7 feet of sea level rise by 2050. In the end, staff chose to assume the medium-high risk aversion scenario and assumed two feet of permanent inundation within the Bay Area for this Plan. It is also expected that the region will receive increased temporary inundation with king tides and storm events. Staff assumed that an additional foot of temporary inundation may occur, as a king tide within the region can add 12 to 16 inches of water alone.

The plan models the impact of two feet of permanent flooding. Three feet of inundation is not ultimately assessed within the plan, as it was difficult to measure the impacts of temporary flooding on regional assets. However, adaptations costed within the plan are assumed in areas vulnerable at up to three feet of sea level rise, thereby affecting their ultimate cost. This preliminary cost estimate is focused on sea level rise inundation caused solely by the rise of the ocean. The estimate does not fully consider upstream flooding impacts from streams and rivers, or the Delta, it does not include possible flooding impacts from groundwater or impacts from erosion, and it does not prevent 100% of flooding impacts. It does include marsh and subtidal restoration and adaptation projects that would provide ecosystem and flood protection benefits.

In addition to sea level height in 2050, the analysis required an assumption for when the sea level would reach one foot of permanent inundation in order to model the earliest effects on land use and transportation. Again, using the OPC guidance, Plan Bay Area 2050 assumes one foot of permanent rise by 2035, reaching two feet in 2050.

While two feet of inundation is the assumed sea level in 2050 based upon state guidance, it is important to remember the lifespan of assets within the plan. If an asset is anticipated to last until 2100, for instance, it may need to be built for 6.9 feet of permanent inundation (under the medium-high risk aversion scenario) or be designed to be adapted to that level of rise. The rate of sea level rise becomes more and more uncertain the further into the future it is explored. The assumptions for this analysis use the best available science and acknowledge the possibility that sea level rise predictions could escalate in the future, especially with a potential flux with emissions rates and subsequent effects of climate change. It is recommended that local jurisdictions develop advanced adaptation plans that consider sea level rise heights beyond three feet of inundation and incorporate adaptive approaches to accommodate higher water levels.

ADAPTATION DESIGN HEIGHT

In order to develop a high-level cost estimate for regional adaptation strategies, a design height assumption was needed for linear adaptation strategies. Plan Bay Area 2050 assumes that the design height of linear adaptation strategies would be nine feet, and 14 feet for less adaptive strategies, such as elevated roadways. The design height assumption is a summation of a series of other interrelated assumptions, each of which needed careful consideration. Assumptions included an intervention height, as well as the expected life cycle of the adaption strategy, which overall was assumed to be 50 years. The rate of sea level rise expected for 2050 was also assumed, as described in previous sections of the report. Additionally, storm surge flooding for a 100-year storm was integrated, as well as two feet of freeboard to assure clearance of the asset above water level. Fourteen feet was chosen for elevated strategies to account for it being a less adaptive strategy, as it cannot be added to for additional height during the course of its lifecycle. Tidal gates and marsh restoration strategies did not utilize design height assumptions.

The intent of Plan Bay Area 2050 is to plan ahead for the region. It is important to note that, despite the assumptions taken by the plan, they do not account for an agency prediction. The plan has chosen these assumptions to begin planning for what may occur by mid-century. The result is a regional scale assessment that identifies areas at risk of permanent inundation over the next 30 years, as well as supporting analysis that explores regional costs to adapt vital communities and systems. Future updates to Plan Bay Area (occurring every four years) will reassess the assumptions as science continues to explore likely sea level rise rates and impacts.

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17 http://www.opc.ca.gov/webmaster/ftp/pdf/agenda_items/20180314/Item3_Exhibit-A_OPC_SLR_Guidance-rd3.pdf.

Future planning efforts will need to reassess such assumptions as the science develops for sea level rise projections and adaptation planning. Local plans will ideally develop their own methodologies for design height assumptions. Adaptation pathways may be helpful in determining intervention points and appropriate life cycles for construction, including points at which assets may need to be added to, or otherwise adapted. Additionally, coastal assets may need further analysis to determine assumptions about the effects of erosion on designing adaptation strategies.

IDENTIFYING SIGNIFICANT INUNDATION

Each year, sea level rise conditions will become progressively more urgent, with impacts spiking when coupled with king tides and big storms. However, impacts from sea level rise are not felt equally across the shoreline. In some areas, steeper topography may limit local flooding, but in others, sea level rise may inundate assets far inland. Analysis helped to understand the disproportionate impacts across the region, both in terms of the level of flooding, and in terms of which communities and assets are at risk. To assess at a regional level, flood impacts at three feet were identified using the Bay Conservation and Development Commission's ART Bay Shoreline Flood Explorer, an online interactive mapping tool. The following data was used to identify areas of regional significance:

- **Future growth areas** (Priority Development Areas, Transit-Rich Areas and High-Resource Areas (areas eligible for future PDA nominations))
- **Socially vulnerable communities** (census tracts with high percentages of residents who are less able to prepare for, respond to, and recover from a flood event)
- **Key transportation corridors** (highways with significant volumes or rail infrastructure)
- **Existing communities** with large numbers of residents and/or jobs

Wherever an impact met minimum thresholds, the affected area was flagged for adaptation, and the corresponding locations of shoreline overtopping that caused inundation were mapped. Additional areas with known planning efforts were flagged individually. The goal was not to try to address all inundation impacts, but rather to identify areas with high levels of regional vulnerability. Some areas with impacts were left unaddressed to account for alternative scenarios, including areas that may adapt on a longer timeline, or communities that may pursue managed retreat.

IDENTIFYING AND COSTING GENERIC ADAPTATIONS

In areas of high vulnerability, staff researched possible adaptation measures to address flooding — if staff became aware of an existing, well-defined strategy, then it was used. The San Francisco International Airport (SFO) seawall, for example, is an existing project that is assumed in the analysis. Where no known strategy existed, staff consulted a series of resources and subject matter experts to imagine a possible adaptation measure, including such resources as EcoAtlas,[18] the Adaptation Atlas,[19] and the CHARG Sea Level Rise Resiliency Map.[20]

High-level costing analysis was developed for 16 different generic adaptation measures, including levees, marsh restoration, seawalls, elevated roadways and tidal gates. Cost estimates were developed one of two ways. Where a cost was known for a planned adaptation measure, such as State Route 37, or the seawall around SFO, these values were used. Additionally, EcoAtlas was used to inventory many of the costs for known marsh restoration projects. Where no planned project existed, but a measure was needed, the cost was based on unit cost methodologies, developed for the purpose of this analysis, with the help of a subject matter expert using regional construction estimates for the different archetype measures.

18   SFEI, "EcoAtlas," 2020, https://ecoatlas.org/.

19   SFEI, Adaptation Atlas, April 2019, https://www.sfei.org/sites/default/files/biblio_files/SFEI%20SF%20Bay%20Shoreline%20Adaptation%20Atlas%20April%202019_highres.pdf.

20   CHARG, "Sea Level Rise Resiliency Map," December 2019, http://esanw.maps.arcgis.com/apps/webappviewer/index.html?id=cffed37d76174710aa05ffcbaac927cb.

Unit cost methodologies are based on the assumption that each adaptation should address at least three feet of sea level rise, with design heights assumed for linear and elevated strategies, as mentioned in Adaptation Design Height. The unit costs were developed as based on the planning, design, environmental clearance, permitting, and construction of a section of adaptation. Costs generally are not assumed to include environmental mitigation, land acquisition, or utility relocation however, a range of costs was initially developed to account for uncertainty about the complexity of different sites. Staff adopted the highest unit costs within the given range, accounting for the highly developed Bay shoreline, and high regional construction costs. The final unit cost assumptions for all adaptations are below in Table 25.

Costs also were developed to account for the possibility of managed retreat on parcels left with unaddressed inundation. Residential parcels were identified on these properties, and property values identified using Redfin, as well as property assessment data from jurisdictions. Properties were assumed to be purchased at full value. Total costs for adaptation through managed retreat are shown in Table 26 due to cost variation by unit.

Table 25. Sea level rise archetype costs

ARCHETYPES AND UNITS	UNIT COST
Levees (Linear Foot)	
Levee – Horizontal (Slope 30:1)	$5,800
Levee – Horizontal (Slope 10:1	$2,800
Levee – Horizontal (Minimum Trail)	$1,000
Levee – Horizontal (2-lane Roadway)	$2,310
Levee – Horizontal (4-lane Roadway)	$3,520
Marsh Restoration (Acre)	
Marsh Restoration	$47,700
Seawalls (Linear Foot)	
Seawalls (Simple)	$4,730
Seawalls (Sloped Berm)	$6,800
Elevated Roadways (Linear Foot)	
Elevated Roadway (2-lane)	$41,470
Elevated Roadway (4-lane)	$75,790
Elevated Roadway (8-lane)	$116,050
Tidal Gates (Unit)	
Small Tidal Gates	$3,000,000
Large Tidal Gates	$20,000,000

Once construction costs were estimated, costs in YOE were calculated, but for most measures, construction dates were unavailable. In order to account for a variance of start dates, it was assumed that an equal fraction of the overall sea level rise need was constructed each year. Exceptions to this can be found in the following section on Known Adaptation Investments.

KNOWN ADAPTATION INVESTMENTS

Several adaptation measures are already being planned for the Bay Area and were included in the analysis, including:

- **SR-37:** Plans for the adaptation are currently in development. For costs relating to this project, staff referenced the SR-37 Resiliency Study, which includes cost estimates for elevated roadways, programming, and associated marsh restoration. Staff referenced all costs identified in the study, as based on the study's escalation rate and construction timeline.

- **SFO Airport:** San Francisco International Airport currently has a plan to create a 10-mile seawall, and initial cost estimates have been provided. Staff escalated the YOE based on the estimated construction year of 2035.[21]

- **Marsh Restoration Projects:** While many of the measures in this archetype category use the generic archetype unit cost methodology, EcoAtlas was used to determine the cost for many projects that are currently planned, or under construction. Where an EcoAtlas cost estimate was available, this value was used in lieu of the unit cost methodology. Approximately 30% of the total number of measures (not by cost) in marsh restoration adaptation archetype were able to be costed using EcoAtlas.

Various costing methodologies were used to determine the high-level regional need for sea level rise adaptation. As mentioned in Known Strategies, there are examples of known adaptation measures already planned across the region. Where these cost estimates are known, they were integrated into the analysis. Otherwise, the unit cost described in Table 25 was used to estimate the cost of generic adaptation strategies. Managed retreat costs were modeled by estimated property value. Table 26 presents the summary of sea level rise need for both known and costed strategies, listed in simplified groups of adaptation archetypes. The needs analysis costs out tidal gates; 100,000 acres of restoration projects; and 150 miles of linear adaptations, including ecotone levees and elevated roadways.

Table 26. Sea Level Rise need (in millions of YOE$)

SIMPLIFIED ARCHETYPES[22]	UNITS	SUBTOTAL[23]
Marsh Restoration	100,000 acres	$6,539
Ecotone Levees	58 miles	$2,413
Traditional Levees	68 miles	$2,534
Seawalls	68 miles	$1,006
Elevated Roadways	13 miles	$4,795
Tidal Gates	11 miles	$152
Managed Retreat	23 units	$1,815
Total		**$19,255**

21 Rogers, Paul. "SFO plans to surround airport with 10-mile wall to protect against rising bay waters," The Mercury News, October 10, 2019.

22 Does not include buyouts or relocation.

23 Includes 1.5% operations and maintenance assumption, as well as a 2.2% annual inflation rate.

ADAPTATION AND TRANSPORTATION NEXUS

Many of the region's vulnerable shorelines include significant local and regional transportation infrastructure, creating a nexus between the resilience and transportation topic areas. In some cases, an adaptation measure may be applied directly to a transportation asset (e.g., elevating a roadway), while in other circumstances effective marsh restoration or levee construction away or adjacent an at-risk transportation asset may provide flood protection. Portions of the $19.255 billion sea level rise need have a varying nexus with the transportation sector.

The relationship between resilience and transportation can lead to a series of complex financing circumstances, which affect both resilience, and the transportation needs and revenues. It is estimated that approximately 62% of the regional sea level rise need has some relationship with regional transportation. Table 27 shows the varying levels of nexus between adaptation and transportation across four categories:

- **Potential Transportation Projects** are considered investments in a transportation system that have a significant impact on air quality. They are paid for with transportation funding, but these projects are ineligible for programmatic transportation funding. The only known example in this category is a planned project to adapt SR-37, in which the road may be simultaneously elevated and widened.
- **Direct Nexus** measures protect a transportation asset (e.g., an elevated road or a levee aligned with a roadway). These measures primarily benefit transportation assets, with little to no co-benefits, and are eligible for transportation funding.
- **Partial Nexus** measures are community-scale adaptations that also protect a transportation asset. They are considered indirect when community measures are the priority of the adaptation. They may be eligible for flexible transportation funding.
- **No Nexus** measures have no clear relationship to a transportation asset and are ineligible for transportation funding.

Table 27. Summary of strategy cost by nexus with transportation (in millions of YOE$)

TRANSPORTATION NEXUS	COST	SUBTOTAL[24]
Potential Transportation Projects	**$5,850**	**30%**
SR-37	$5,850	
Direct Nexus with Transportation	**$2,200**	**11%**
Interregional Rail Corridors[25]	$620	
US-101, Marin	$890	
Collection of 21 smaller measures	$690	
Partial Nexus with Transportation	**$2,790**	**14%**
Collection of 48 smaller measures	$2,790	
No Nexus with Transportation	**$8,414**	**44%**
Collection of 105 smaller measures	$8,414	
Total	**$19,255**	**100%**

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24 Includes 1.5% operations and maintenance assumption, as well as a 2.2% annual inflation rate.

25 Interregional rail corridors include Capitol Corridor, ACE and San Joaquin rail lines. The unit cost methodology for rail lines is based upon similar roadway typologies. These values have been used as a placeholder value to project a minimum value of need for adaptation efforts along rail corridors.

Strategy EN2: Provide Means-Based Financial Support to Retrofit Existing Residential Buildings

Strategy EN2: Provide Means-Based Financial Support to Retrofit Existing Residential Buildings proposes that vulnerable residential structures go through a comprehensive building retrofit, in which their seismic and wildfire risk are addressed, in addition to their water and energy efficiency. A series of assumptions were made to assume the need for both earthquake and wildfire hazards, as shown below.

The strategy is structured to provide subsidies for residents and tenants, with subsidy rates higher for communities in need, and higher cost mitigations. For example, wildfire retrofits have the lowest subsidy level of the four improvement types, as analysis suggested that relatively fewer households with low incomes lived in housing at risk of wildfire. While the cost estimate does not vary based on the income level of the household whose housing unit is improved, the strategy would focus efforts on providing retrofit subsidies to families with lower incomes who would otherwise struggle to afford the retrofit. The total cost of the residential building retrofit strategy is $14.5 billion. A summary of the cost for all retrofit types is shown below in Table 28.

Table 28. Needs for modernize existing residential buildings strategy (in millions of YOE$)

RETROFIT TYPE	HOMES	TOTAL RETROFIT COST	SUBSIDY RATE	SUBSIDY NEEDED
Earthquake	385,000	$5,000	58%	$2,900
Wildfire	125,000	$4,100	33%	$1,300
Water	175,000	$6,800	75%	$5,100
Energy	650,000	$10,100	50%	$5,000
Total		$26,100		$14,500

EARTHQUAKE

No regional dataset exists with the structural characteristics of every building, but staff have used available building information in the region — building use, year built, number of units, and number of stories — as proxies to develop high level estimates for the number of likely common seismically vulnerable building types. These include cripple walls where an unbraced and unbolted crawl space can shift a house off its foundation, or soft story buildings where a weakened first floor, often due to large garage openings, can pancake on the first floor. Additional assumptions, as well as a breakdown of seismic needs, can be found in Table 28.

Some cities in the region have passed ordinances requiring soft-story multifamily building owners to retrofit, and the State of California is gradually expanding a grant program designed to incentivize homeowners with cripple walls to retrofit. Table 29 summarizes the regional need for earthquake retrofits, while Table 30 summarizes the cost of the subsidies envisioned as part of the strategy.

Table 29. Total need for residential building retrofits (in millions of YOE$)

	HOME TYPE	NUMBER OF BUILDINGS[26]	NUMBER OF UNITS[27]	RETROFIT COST[28] (PER UNIT)	ESCALATED COST[29] (IN MILLIONS)
Single-Family Homes	Cripple Wall[30]	125,000	125,000	$8,000	$1,400
	Soft Story[31]	30,000	30,000	$20,000	$900
Multi-Family Homes	Cripple Wall (2-4 units)[32]	20,000	65,000	$10,000	$600
	Soft Story (2-4 units)[33]	10,000	35,000	$15,000	$700
	Soft Story (5+ units)[34]	10,000	130,000	$8,000	$1,500
	Total	**195,000**	**385,000**		**$5,100**

The subsidies assumed for the earthquake portion of the strategy are means-based, with higher subsidies for multi-family units, and to account for higher construction costs. Subsidy rates range from 33% to 75%, with an average of 58% for seismic retrofits. For details on the final cost for seismic retrofits, see Table 30.

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26 The number of buildings is estimated based on proxy regional building data values. The age of a building, the number of stories, and the use are used to estimate the possible number of buildings and units with possible seismic deficiencies. It is assumed that 70% of possibly at-risk buildings are actually at risk based on real inventory data from a select set of cities. Values are rounded to nearest 5,000 buildings.

27 The number of units are based on the characterization of the buildings and available unit attribute data. It is assumed that 70% of possibly at-risk units are actually at risk based on real inventory data from a select set of cities. Values are rounded to the nearest 5,000 buildings.

28 The unit costs are based on both subject matter expert guidance and from available data. See other footnotes for specific assumptions made for each building type. Unit cost is shown in 2020 dollars.

29 The escalated cost assumes that an equal portion of buildings are retrofit in each year from 2020 through 2050, with the unit cost increasing by a rate of 2.2% annually.

30 Single-Family Cripple Wall homes are typically built prior to the 1950s and have an unbraced crawl space between the ground and the first floor of the home. Average costs are based on subject matter expert guidance with direction from data collected by the California Earthquake Authority's (CEA) Brace and Bolt Program. 3,000 of these homes have been removed because they completed a retrofit through the CEA program.

31 Single-Family Homes with a portion or the entirety of a home above a garage are a deficient building type, sharing the same challenge as their multi-family counterparts. The cost estimate is based entirely on subject matter guidance and is the roughest estimate included in the table.

32 Multi-Family Cripple Wall homes with two to four units are likely to be similar in construction to single-family homes, and in many cases may be converted single-family homes. Staff build the assumed unit cost off the subject matter expert cost for single-family cripple walls, assuming a larger square footage, thus increasing the cost of the building, but reducing the unit cost.

33 Multi-Family Soft Story Buildings with two to four units come in a variety of shapes in sizes with limited data on cost. Staff used assumptions from the subject matter expert costs for single-family soft story retrofit costs ($20,000) and data on five- and six-unit buildings ($12,000) to assume a per unit cost of $15,000.

34 Multi-Family Soft Story Buildings of more than five units are the common cut-off for mandatory soft story ordinances. Buildings with large openings on the first floor built before 1992 may be at risk, with buildings built prior to 1978 at a greater risk. Using data provided by the City and County of San Francisco, on over 4,000 soft-story retrofit permits staff calculated the average retrofit cost on a per unit basis. The per unit cost is greatest for smaller five- and six-unit buildings at $12,000 per unit, while larger buildings have costs below $5,000 per unit. These values are averages, some smaller buildings and larger buildings have higher and lower per unit costs. 7,000 buildings have been removed from the total to reflect buildings that have already been retrofit or are currently required to be retrofit by a mandatory policy.

Table 30. Earthquake subsidy need included in cost estimate (in millions of YOE$)

	HOME TYPE	TOTAL COST	SUBSIDY RATE	SUBSIDIZED COST
Single-Family Homes	Cripple Wall	$1,400	33%	$470
	Soft Story	$900	50%	$430
Multi-Family Homes	Cripple Wall (2-4 units)	$600	66%	$370
	Soft Story (2-4 units)	$700	75%	$560
	Soft Story (5+ units)	$1,500	75%	$1,110
	Total	**$5,100**		**$2,900**

This analysis does not present the financial need to retrofit every known seismically deficient building type. Brick buildings, non-ductile concrete buildings and homes on hillsides are known deficient buildings, but they represent a difficult-to-capture group of structures with existing regional data sets and represent more complex and expensive retrofit solutions. The seismic needs and revenue analysis has focused on common deficient residential building types with known and relatively affordable retrofit solutions.

WILDFIRE

Staff focused on two primary mitigation measures for residential structures vulnerable to fire hazard: structural hardening and defensible space. In particular, the cost estimate for structural hardening considered the cost to replace wood shake roofs or untreated shingle roofs with Class A roofing materials, which offer the highest rating of fire protection. These improvements are one-time investments that last for the 30-year plan period. Defensible space improvements, which would help bring residential properties into compliance with state standards, are expected to occur regularly, as vegetation continues to grow. The cost estimate considers the cost of 2 days of groundwork and treework, as well as rental costs for machinery such as a woodchipper, which would occur roughly once every four years.

The per-home cost estimate was applied to 8,300 homes annually — enabling the 125,000 homes built before the adoption of 2009 fire codes that are located in high- or very high-fire risk zones in the region, per CalFIRE's hazards map — to be retrofitted over the 30-year plan period. An estimated $4.1 billion would be needed to fully cover the costs of the structural hardening and rounds of defensible space clearance. The strategy assumes a 33% subsidy rate, meaning the public cost of the strategy would be $1.3 billion.

The analysis does not account for the variation in risk from different fire hazard zones. Additionally, fire risk in particular is often not limited by geography, and it can affect communities in regions of lower risk. The analysis also was not able to account for prevention efforts already underway in different communities. The analysis for wildfire adaptation only accounts for known structural deficiencies in regional residential structures.

Table 31. Wildfire mitigation costs per home (in dollars)

ELEMENT	UNIT COST	UNITS	COST
Structural Hardening			
Roof Replacement (Class A Roof Type)[35]	$5.5/ ft2	1,700	$9,400
Vent Actions[36]	$400/roof	1	$400
Subtotal (Once per Home)			**$9,700**
Defensible Space[37]			
Chipper Costs	$400/2 day session	7	$2,800
Labor Costs (Groundwork)	$400/2 day session	7	$2,800
Labor Costs (Treework)	$1,200/2 day session	7	$8,400
Subtotal (30 year Cost per Home)			**$14,000**
Total			**$23,700**

It is important to note the high-level assumptions used for this analysis due to a lack of available data. Costs were based on regional averages and vary widely by property. Cost estimates only include roof replacement and an assumption of defensible space; other strategies that may be used for structural hardening are excluded. Additionally, this study does not account for all properties with wildfire risk, as wildfire is known to transcend fire hazard severity zones.

WATER

Water management is a critical priority for the Bay Area and much of California. Policies are already in place to guide water consumption throughout the region, many of which have proven to be highly effective. The cost estimate is based on investment in turf replacement, indoor efficiency upgrades and plumbing retrofits. The first two retrofit types primarily seek to reduce water demand, while replumbing seeks to guarantee healthy and reliable building piping – an area with the potential for significant equity impacts, given that families with low incomes and those living in older buildings are more likely to be impacted by tap water contamination.

Staff relied on a variety of sources for information on the costs for these retrofits. While costs will vary on a project-by-project level, these placeholder costs provide a helpful sense of magnitude. Costs of retrofits for each home are summarized in Table 32, with the average home requiring $27,400 in investment. It was assumed that 5,800 homes would be retrofitted each year throughout the plan period, for a total of 175,000 homes improved. Costs were escalated for inflation by 2.2% each year, and a 75% subsidy was assumed. The total cost of implementing these retrofits sums to $6.8 billion, $5.1 billion of which would be covered by public subsidies.

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35 Cost from: https://www.fixr.com/costs/install-roof-shingle. Average roof size from: https://www.roofingcalc.com/roof-replacement-cost/#:~:text=The%20average%20residential%20roof%20size,the%203%2Ddimensional%20roof%20surface.

36 Cost from: https://headwaterseconomics.org/wp-content/uploads/building-costs-codes-report.pdf

37 Cost from: http://www.southskylinefiresafe.org/Home/creating-your-defensible-space.

Table 32. Water retrofit costs per home (in dollars)

RETROFIT ELEMENTS	UNIT COST	UNITS	COST
Outdoor Efficiency (Turf Conversion)[38]	$3/ft2	6,300	$18,900
Indoor Efficiency[39]	-	-	$2,500
Toilets (MaP Premium HETs)	$125/unit	1	$100
Faucets (1.8gpm)	$25/unit	4	$100
Shower Heads (1.8gpm)	$25/unit	1	$0
Washing Machines (EnergyStar)	$1,000/unit	1	$1,000
Water Heater (Electric)	$1,200/unit	1	$1,200
Replumbing[40]	$6,000/multi-family unit	1	$6,000
Total			$27,400

ENERGY

This component of the strategy envisions a support for some of the most effective energy efficiency strategies facilitated by the Bay Area Regional Energy Network (BayREN), an ABAG program that provides regional-scale energy efficiency programs, services and resources. The cost estimate is based on investment in insulation replacement, HVAC and water pump upgrades, and smart home measures like smart thermostats and power-saving powerstrips, in a share of homes in the region.

The total cost of implementing the envisioned suite of energy efficiency upgrades in the typical Bay Area single-family home (Table 33) was calculated using BayREN program estimates. On average, each home would require roughly $10,900 to cover retrofit costs. An assumed 21,700 homes would receive this one-time benefit each year over the strategy's lifespan, for a total of 650,000 homes receiving upgrades. Assuming a 75% subsidy rate and that costs increased by 2.2% each year in tandem with inflation, this component of the strategy was estimated to require $10.1 billion in funding available for retrofitting, including $5.0 billion of that in public subsidy to implement. While costs are based on retrofits to single-family homes due to data availability, multi-family units would also be eligible to receive upgrades through this strategy.

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38 Average yard square footage based on research from the Public Policy Institute of California, with the assumption that half of the average yard acreage would need a landscape conversion (e.g., from turf to drought-tolerant landscaping). https://www.ppic.org/content/pubs/cep/EP_706EHEP.pdf . Cost from: https://www.scpr.org/news/2015/07/14/53093/8-options-for-replacing-your-lawn-along-with-their/#:~:text=Drought%2Dtolerant%20garden%20(California%2Dfriendly)&text=Same%20as%20California%20native%20plants,per%20square%20foot%2C%20including%20labor.

39 Costs for indoor efficiency upgrades are based on prices at Home Depot

40 Cost adapted from: https://www.latimes.com/archives/la-xpm-2005-jul-03-re-aptlife3-story.html

Table 33. Energy retrofit costs per home (in dollars)

RETROFIT ELEMENTS	UNIT COST	UNITS	COST
Attic (R-44) insulation[41]	$1.53/ft2	1,418	$2,200
Wall (R-13) insulation[42]	$1.15/ft2	875	$1,000
HP HVAC	$731.05/cap-ton	4	$2,900
High-efficiency air conditioner	$368.50/cap-ton	4	$1,500
Duct repair/seal	$608.58/cap-ton	4	$2,400
HP water heater	$654 each	1	$700
Smart thermostat	$187 each	1	$200
Tier 2 advanced power strip	$38 each	1	$0
Total			**$10,900**

Strategy EN3: Fund Energy Upgrades to Enable Carbon Neutrality in all Existing Commercial and Public Buildings

Staff used a recent state analysis of decarbonization to estimate the cost of a decarbonization program for existing public and commercial buildings. The state level analysis uses its own assumptions to estimate the total number of building square footage across different building types in the state. The Plan Bay Area 2050 strategy focused on private small and medium commercial buildings, as well as, large commercial and municipal, university, school, and hospital buildings. Each of these two segments in the study had corresponding assumptions about the types of upgrades that were needed to upgrade that building typology, upgrades like: water heating, space heating, cooking, and panel upgrades. The study used other literature to assume unit costs, typically by square footage, to then estimate the total cost to decarbonize these existing buildings in the state. A regional value was taken as 20% of the state total. From there staff took the overall cost to decarbonize these building classes and considered different subsidy rates based on whether a retrofit component was a pre-requisite for other decarbonization work (e.g., panel upgrades), or something that could be phased in when building components reached the end of their useful function. For the items that could be replaced as part of a traditional O&M schedule a 33% subsidy was assumed. For items that would be added cost to a traditional O&M schedule a 100% subsidy was assumed.

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41 Average attic square footage based on applications received by the BayREN single-family home program in 2019.

42 Wall square footage is based on applications received by the BayREN single-family home program in 2019.

Table 34. Cost estimates for commercial and public building decarbonization costs

DECARBONIZATION STRATEGY	ESTIMATED COMMERCIAL BUILDING SPACE USING GAS[43]		UNIT COST		TOTAL COST ($M)[44]	SUBSIDY	BAY AREA SUBSIDY ($M)
Private Small and Medium Commercial							
Water Heating	533	million ft²	$1	/ft²	$549	33%	$181
Space Heating	463	million ft²	$3	/ft²	$1,559	33%	$514
Cooking	24	million ft²	$20	/ft²	$480	33%	$158
Misc. (Dryers, Pools/Spas)	100	million ft²	$2	/ft²	$149	0%	$0
Process	27	million ft²	-			0%	$0
Energy Efficiency	74,000	buildings	$8,000	/bldg	$592	50%	$296
Building Modification	14,800	buildings	$35,000	/bldg	$518	100%	$518
Gas Disconnection	14,800	buildings	$600	/bldg	$9	100%	$9
Panel Upgrades	14,800	buildings	$24,000	/bldg	$355	100%	$355
Subtotal (Small and Medium Commercial)					$4,211		$2,032
Large Commercial and Municipal, University, School, Hospitals (MUSH)							
Deep Energy Retrofits	491	million ft2	54	/ft2	$26,617	33%	$8,784
Carbon-Free District Energy for Heating and Cooling	138	million ft2	39	/ft2	$5,366	33%	$1,771
Heat Pump Water Heater	138	million ft2	0.5	/ft2	$65	33%	$21
Commercial Kitchen Electrification	9	million ft2	20	/ft2	$180	33%	$59
Misc.	28	million ft2	2	/ft2	$55	100%	$55
Subtotal (Large Commercial and MUSH)					$32,283		$10,690
Total (All Commercial and MUSH)					**$36,495**		**$12,722**

43 Assumes (i) 20% of commercial and MUSH buildings are in the Bay Area. (ii) subsidy provides at least 33% of retrofit cost and up to 100% of cost for enabling electrification elements (e.g., electrical panel upgrades).

44 UCLA Luskin Center for Innovation. California Building Decarbonization: Workforce Needs and Recommendations (Tables 26-30). November 2019. https://innovation.luskin.ucla.edu/wp-content/uploads/2019/11/California_Building_Decarbonization.pdf.

Expand Access to Parks and Open Space

The Bay Area has made substantial investments in conserving agricultural and open space lands, as well as expanding trail and park facilities over the last several decades. Over the next 30 years, ensuring a robust network of natural and working lands are protected will be critical for regional resilience and for the myriad environmental and public health benefits these lands provide. As a preliminary approach into the broad sphere of conservation, this assessment has focused on two challenges: agricultural and open space protection and management; and modernizing and expanding parks, trails, and recreation facilities. This assessment also includes efforts to address upland resilience challenges related to wildland fires, drought, and riverine flooding that will require deep investments.

This document discusses the financial assumptions of the Plan Bay Area 2050 Environment Needs and Revenue analysis. It analyzes the needs and revenue for 2021-2050, which have been developed in consultation with stakeholders and subject matter experts. The analysis focuses on the assumptions associated with two Plan Bay Area 2050 strategies: Protect and Manage High-Value Conservation Lands (EN5) and Modernize and Expand Parks, Trails, and Recreation Facilities (EN6).

As part of creating a more comprehensive regional plan, Plan Bay Area 2050 is expanding the scope of the Needs and Revenue Assessment to include conservation and management a regional network of agricultural, open space, and park lands. To do so, staff identified priority conservation and park lands, identified and costed generic conservation options, assessed access to parklands, and used the elements of the analysis to inform the land use and transportation analysis. Many assumptions were made throughout the analysis that ultimately affected the financial assumptions for expanding access to parks and open space. These assumptions are explained in the sections below.

Conversion of natural and working results in significant short-term and long-term greenhouse gas emissions. Urban land uses emit 58 times more greenhouse gas emissions than agricultural land uses and 217 times more than natural lands.[45] Greenhouse gas emissions from sprawl development are particularly high. Sprawl development typically requires personal vehicles to get to work and services, as public transit is often not cost-feasible to provide to lower density areas. Due to this vehicle dependency and the longer distance from major employment centers and other services, sprawl development results in significantly higher vehicle miles traveled (VMT) and associated greenhouse gas emissions. Therefore, limiting the conversion of these lands to higher greenhouse gas emitting uses will also be critical to achieving greenhouse gas emission reduction targets established under Assembly Bill 32.

Strategy EN5: Protect and Manage High-Value Conservation Lands

The Conservation Lands Network (CLN) 2.0 Report and data framework were utilized to identify regional priority areas for conservation. CLN provides a detailed, science-based approach to prioritize conservation of 50% of the Bay Area's natural and working lands by 2050.[46]

Utilizing spatially explicit environmental data and informed by local ecologists and biologists, CLN maps priority conservation areas to support protection of a full representation of the Bay Area's habitats in robust amounts to ensure long-term resilience of the region's biodiversity. This analysis compares existing conserved lands against an inventory of natural habitats ranked for rarity and ecosystem importance and also considers priority stream corridors, habitat connectivity, and groundwater recharge areas. Based on this analysis, lands were categorized into four classes:

- **Essential** — Lands that tend to contain high-value conservation targets, are located adjacent to existing protected lands, or play key roles in local habitat connectivity.
- **Important** — Lands with more common vegetation types that may be interchangeable with other potential conservation lands with similar biodiversity values.
- **Connector** — Lands that provide corridors to connect local habitats and support landscape resilience.
- **Contributing** — Lands that are not essential or important, but that still contribute to regional conservation goals.

Plan Bay Area 2050 strategies would result in the conservation of all essential, important, and connector lands identified in CLN by 2050 in each county (Table 36).

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45   Shaffer, S. and Thompson, E. 2015. A New Comparison of Greenhouse Gas Emissions from California Agricultural and Urban Land Uses.

46   Conservation Lands Network. https://www.bayarealands.org/.

Table 36. Priority land conservation goals

COUNTY	ACRES PROTECTED (2018)	PROTECTION GOALS (2050)	ACRES REQUIRING PROTECTION (2050)
Alameda	124,000	176,000	52,000
Contra Costa	148,000	206,000	58,000
Marin	201,000	250,000	49,000
Napa	157,000	324,000	167,000
San Francisco	5,000	5,000	0
San Mateo	121,000	164,000	43,000
Santa Clara	258,000	419,000	161,000
Solano	76,000	137,000	60,000
Sonoma	217,000	535,000	318,000
Total	**1,308,000**	**2,215,000**	**907,000**

TYPES OF LAND CONSERVATION POLICY APPROACHES

The Bay Area has protected over 1.3 million acres with a variety of conservation and open space preservation policy tools. These tools range from land use regulations to public acquisition, but all result in the long-term protection of natural and working lands from urbanization. An overview of the primary conservation policy tools[47] is provided below:

- **Land Use Regulation and Zoning:** Examples include general plan land use designations and regulation of development rights, such as in sensitive habitat or riparian zone ordinances

- **Compensatory Regulation:** Offers possible regulatory relief, increased public land acquisition revenues, compensation for affected landowners and permanent conservation

- **Fee Simple Acquisition:** Land acquired outright by public or private entity for the purpose of conservation

- **Land or Fee Exactions:** Developer pays fees (to be used for land acquisition) or donates land in exchange for development permit

- **Purchased and Donated Development Rights:** Landowner sells development rights or donates them as a conservation easement

- **Mitigation Banking:** Public or private entity acquires and manages open space lands for preservation ahead of any need for development. The entity banks mitigation credits from setting aside these lands against future development projects that have great impact

- **Transferable Development Credits:** Landowner of open space, habitat, or agricultural land (sender) voluntarily agrees to sell or transfer development credits to a landowner-developer (receiver) wishing to increase the density on a developable parcel; local government facilitates by allowing an increase in density on the receiving parcel in exchange for a perpetual conservation easement on the receiving parcel

- **Tradable Conservation Credits:** Developers pay conservation credits in exchange for the right to develop or a landowner can voluntarily preserve their land to receive credits that are tradable on the market

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47   Policy tool descriptions adapted from Saving Open Space: The Politics of Local Preservation in California by Daniel Press (2002).

Nearly all policy protections are applied and managed at the local or county level, though some land use regulations may be required due to federal or state requirements (e.g., Endangered Species Act). To achieve regional conservation objectives, is anticipated that local conservation agencies and stakeholders would continue to apply these tools in order to protect priority lands. Currently, transferable development credits and tradable conservation credits have had limited application in the Bay Area, but policy capacity could be expanded to allow implementation of these tools that could provide a financial return to landowners while supporting Plan Bay Area goals of increased density in already urbanized areas.

CONSERVATION AND MANAGEMENT FOR RESILIENCE

Land management actions and associated costs vary significantly depending on the management goals of the property and site characteristics (topography, vegetation). Strategic conservation and active stewardship are required to ensure the long-term resilience of Bay Area lands to climate change. Plan Bay Area strategies would support conservation and management to enhance wildland fire resilience, provision of ecosystem services, and carbon sequestration.

FIRE RESILIENCE

California has seen most of its largest wildfires on record in the past decade. These fires have burned thousands of homes and taken numerous lives, primarily in communities in the wildland-urban interface. Fires in the urban environment and in the wildland-urban interface result in direct damage to the built environment and can injure or kill residents. Wildland fires can cause damage to linear infrastructure systems that serve the Bay Area, causing outages downstream of the failure; can impact the air quality in cities during the duration of the fire; and can impact water quality in watersheds impacted by a wildland fire. Wildland and wildland-urban interface fires can also damage natural environments, such as recreational areas, and can cause lasting impacts to slopes and soils.[48]

Future fire risk modeling typically analyzes two primary variables: fuel availability and flammability of fuel. In California, the change in fire risk is a result of either a densely forested ecosystem becoming drier, or a dry climate experiencing large vegetation growth after a year of above average precipitation. Climate impacts (higher temperatures, less snowpack, earlier springs) are anticipated to result in previously wet dense fuel ecosystems (forests) becoming dry — increasing the fire risk. For lands dominated by grass and low-density shrubs, the availability of fuel is the governing variable for fire risk, which remains unchanged or decreases as a result of projected precipitation.

The risks associated with wildland fires are anticipated to keep rising in the coming decades, so limiting the number of structures along the urban-rural interface will be essential to reducing the impacts of these natural hazards on public health and safety. Limiting new development in the urban-wildland interface and conservation of open space near existing communities allows for fire containment and the ability to perform a wider range of fire management actions such as targeted tree thinning, construction and maintenance of fuel breaks, prescribed burning, grassland grazing, and other vegetation management. Plan Bay Area 2050 strategies would support increased investment and implementation of these and other management strategies to reduce the severity and impacts of wildland fires on Bay Area communities and the environment.

ECOSYSTEM SERVICES

Ecosystem services generally refer to natural processes that directly benefit humans. These services can broadly be classified under three categories:[49]

1. **Provisioning services** — The products that people obtain from nature such as fresh water, cultivated crops and livestock, wood from forests, or ores from mining;

2. **Cultural services** — Nonmaterial quality of life benefits such as natural beauty, recreation, biodiversity, and mental and physical health benefits; and,

3. **Regulating services** — Moderating effects that reduce the impact of the environment on people or improve livability, such as flood mitigation and coastal protection provided by wetlands, air purification, shade and heat wave mitigation, and drinking water quality protection.

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48   ABAG, 2017. San Francisco Bay Area Risk Profile. https://abag.ca.gov/sites/default/files/riskprofile_4_26_2017_optimized.pdf.

49   Adapted from Conservation for Cities Conservation for Cities: How to Plan & Build Natural Infrastructure by Robert McDonald (2015).

As lands are fragmented and developed, they lose the capacity to provide some or all of these services, which can degrade air quality, impair water quality and quantity, reduce biodiversity, and increase risks from natural hazards. State and federal agencies are increasingly considering the impact to these services when assessing damages from disasters such as major floods and wildfires, as well as the role healthy natural systems can play in reducing the risk of such events.[50] A more comprehensive understanding of the costs and benefits associated with changes in land use and management could help to inform policy decisions and investments in conservation and land management that could strengthen public support for land use-related GHG emission reduction policies.

CARBON SEQUESTRATION

While SB 375 does not currently allow ecosystem services benefits to be included in achieving GHG reduction targets, the State of California has acknowledged the urgency to conserve, restore, and manage, natural and working lands for their ability to sequester carbon. The Draft 2030 Natural and Working Lands Climate Change Implementation Plan "poses an increase in State-led conservation, restoration, and management activities from two to five times above current levels, to achieve a level of effort commensurate with that invested in other sectors of California's climate change portfolio." This plan identifies the importance of land use decisions in regional plans toward meeting these goals.

SUMMARY

Performing a regional cost analysis to achieve conservation objectives is notoriously challenging, given the temporal and spatial variability in land protection costs. The cost per acre was based on a Horizon analysis, using an average of actual costs for land acquisition by several local conservation agencies. The costs per acre for land management were determined by averaging the annual stewardship budget of several large regional park or open space districts by the number of acres managed.

This strategy assumes that roughly 85% of all newly acquired lands would be purchased through fee simple acquisition. It assumes that 1/30th of the 771,180 acres are acquired each year, with maintenance costs applied annually to the amount of acreage acquired by that year. The Parks strategy assumes the acquisition and maintenance of 15% of the remaining lands.

Table 37. Summary strategy costs (in billions of YOE$)

FUNDING ELEMENT	NEED (ACRES)	2050 COST
Acquire Natural and Working Lands (85%)	771,180	$13.7
Maintain Natural and Working Lands	771,180	$1.3
Total		$15.0

Strategy EN6: Modernize and Expand Parks, Trails and Recreation Facilities

This strategy would fund enhancements to regional and local parks, development and maintenance of parks and recreation facilities, acquisition of new open space, and construction of cross-jurisdictional trails and greenways with an emphasis on expanding recreation opportunities in Equity Priority Communities and other underserved areas.

There are over 3,000 unique publicly accessible parks in the Bay Area offering a wide range of park types, characteristics, and sizes.[51] Cumulatively, these parks and other publicly accessible protected areas amount to 897,300 acres across the nine Bay Area counties. The vast majority of this parkland acreage is in open spaces that are managed to support public recreation. For financial analysis, it was important to determine the difference in acreage of community parks located in urban or suburban areas compared to open space parks. An analysis of the California Protected Areas database was performed to determine the total acres within each county for city operated parks of less than 20 acres (Table 37).

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50   Federal Emergency Management Agency (FEMA) allows the inclusion of environmental values in cost-benefit analysis for flood risk reduction projects and post-wildfire restoration projects

51   Bay Area Balance: Preserving Open Space, Addressing Housing Affordability (2017)

Table 38. Open space and community parklands per county

COUNTY	PUBLICLY ACCESSIBLE PROTECTED AREAS	COMMUNITY PARKS		AVERAGE COMMUNITY PARK SIZE
	Acres	Acres	Percent	Acres
Alameda	101,000	1,868	1.85%	4.7
Contra Costa	111,000	1,444	1.29%	4.8
Marin	144,000	749	0.52%	4.6
Napa	122,000	415	0.34%	3.1
San Francisco	5,000	602	11.08%	2.8
San Mateo	86,000	984	1.15%	4.0
Santa Clara	179,000	1,578	0.88%	3.7
Solano	47,000	702	1.50%	6.0
Sonoma	102,000	766	0.75%	4.5
Total	897,000	9,108	2.15%	4.23

Access to parks and open space is another important metric in understanding needs for outdoor recreation opportunities. The State of California Parks and Recreation Department's Statewide Comprehensive Outdoor Recreation Plan (2015) has established goals of having all Californian's live within a half-mile of a park and a minimum of three acres of parks per 1,000 residents.[52] Utilizing data from the Parks for California database, each county was analyzed against these metrics to inform the number of acres of parks needed (Table 38).

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52 http://reports.parksforcalifornia.org/2015scorp/

Table 39. Existing and remaining miles of regional trails per county

COUNTY	TOTAL POPULATION	FURTHER THAN ½ MILE FROM PARK		< 3 ACRES OF PARKS PER 1,000		PARK NEED (VERY HIGH AND HIGH)
		Population	Percent	Population	Percent	Acres
Alameda	1,515,100	121,200	8%	984,800	65%	14,400
Contra Costa	1,052,000	199,900	19%	568,100	54%	31,900
Marin	252,800	10,100	4%	22,700	9%	300
Napa	136,600	32,800	24%	60,100	44%	5,900
San Francisco	807,800	0	0%	678,500	84%	0
San Mateo	721,200	64,900	9%	439,900	61%	5,800
Santa Clara	1,788,400	214,600	12%	1,305,500	73%	29,300
Solano	414,200	82,800	20%	161,500	39%	10,700
Sonoma	483,500	140,200	29%	203,100	42%	16,400
Total	7,171,600	866,600	14%	4,424,400	52%	114,800

This strategy would also support a robust network of regional trails. The total number of miles of regional trails in each county was calculated using data from Bay Area Greenprint (Table 39). Of these, it was assumed that 80% of remaining regional trails would be in open space and 20% of trails would be in urban areas. For the purposes of analysis, this strategy assumed that the majority of urban trails would be implemented under the Complete Streets strategy.

Table 40. Existing and remaining miles of regional trails per county

COUNTY	EXISTING REGIONAL TRAILS	POTENTIAL REGIONAL TRAILS
Alameda	263	357
Contra Costa	258	303
Marin	195	84
Napa	54	190
San Francisco	54	22
San Mateo	152	95
Santa Clara	263	350
Solano	45	81
Sonoma	72	102
Total	1,356	1,584

To meet the park needs identified, as well as to maintain these parks and open space assets, staff made a variety of assumptions based on available information for recent park construction, renovation, and maintenance costs. These costs were developed per acre by averaging the recent costs available from a variety of public sources depending on the type of recreation asset. These assets include new community parks, renovated community parks, regional open space parks and new trails.

This strategy assumes that 1/30th of the total parkland acres are acquired each year, with maintenance costs applied annually to the amount of acreage acquired by that year.

Table 41. Summary of park, trail and open space costs (in millions of YOE$)

	STRATEGY ELEMENT	VALUE	UNITS	COST PER UNIT	30-YEAR COST
Capital Costs (Acquisition, Construction, Renovation)	Community Park (New)	1,500	acres	$2.688[53]	$5,800
	Community Park (Renovation)	1,380	acres	$3.371[54]	$6,600
	Regional Open Space Park	136,080	acres	$0.067[55]	$13,100
	Trail (New)	1,260	miles	$0.100[56]	$200
Maintenance	Community Parks and Rec	2,880	acres	$0.030[57]	$2,100
	Regional Open Space Park	136,080	acres	$0.000[58]	$100
	Trails	1,260	miles	$0.004[59]	$1,300
	Total				**$29,200**

Reduce Climate Emissions

Reducing climate emissions through transportation planning is a primary aim of Plan Bay Area 2050, and many strategies contribute toward lower emissions per capita. Strategies in this theme focus on reducing emissions through supporting sustainable commuting patterns, clean vehicle adoption and lower rates of single-occupancy vehicle travel.

Strategy EN8: Expand Clean Vehicle Initiatives

This strategy expands on two initiatives associated with electric vehicles (EV) and EV charging infrastructure carried over from Plan Bay Area 2040: (1) Initiative EN8a Regional Electric Vehicle Chargers and (2) Initiative EN8b Vehicle Buyback and Electric Vehicle Incentive. These programs support two types of EVs: plug-in hybrid electric vehicles (PHEV) and battery electric vehicles (BEV).

The regional EV charger program would provide subsidies and incentives for the purchase and installation of public EV charging stations. The program would offer $3,000 per charger. Plan Bay Area 2050 invests $304 million to fund 42,700 chargers (each with two plugs) by 2035 and 54,000 chargers by 2050.

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53 Average of recent park construction project costs per acre in the Bay Area funded by the Statewide Park Development and Community Revitalization Program.

54 Average of recent park renovation project costs per acre in the Bay Area funded by the Statewide Park Development and Community Revitalization Program.

55 Average of real property value for conservation land acquisition, including properties closer to urbanized areas developed under the Regional Advance Mitigation Planning Program Cost Report

56 Horizon estimate based on conversations with several trail organizations.

57 Based on a 2005 review of average per acre costs for parks in large metropolitan areas, adjusted for inflation and higher Bay Area costs.

58 Average of publicly available maintenance costs for the East Bay Regional Park District, Peninsula Open Space District, and Sonoma County Ag and Open Space District based on annual maintenance budget divided by total acres managed.

59 Horizon estimate based on conversations with several trail organizations.

The Vehicle Buyback and EV Incentive initiative accelerates the turnover of the existing fleet of gasoline and diesel vehicles by offering EV purchase incentives for scrapping older polluting vehicles. Incentives would be provided for both PHEVs and BEVs. The program would offer higher rebate amounts for lower income purchasers. Households with incomes in the lowest quantile would be offered rebates that cover the average difference between the cost of conventional vehicle and an equivalent electric model: $13,600 for BEVs and $6,000 for PHEVs. Rebates for other households are relative to the income thresholds for each quantile (e.g., with the income threshold for Q2 at $100,000 double the threshold for Q1 at $50,000, the rebate for Q2 is half the rebate for Q1 households) with no rebates for households making $170,000 or more. Table 42 summarizes the rebate amounts by vehicle type and household income.

The Plan invests $5.1 billion for 630,000 buyback incentives by 2035.[60]

Table 42. Electric vehicle subsidies by household income quantile

QUANTILE (HOUSEHOLD INCOME)	NUMBER OF VEHICLE REBATES		REBATE AMOUNT PER VEHICLE	
	BEV	PHEV	BEV	PHEV
Q1 (up to $50,000)	147,000	63,000	$13,600	$6,000
Q2 ($50,000-$100,000)	147,000	63,000	$6,800	$3,000
Q3 ($100,000-$170,000)	147,000	63,000	$4,000	$1.765
Q4 ($170,000+)	0	0	$0	$0
Total	441,000	189,000		

Strategy EN9: Expand Transportation Demand Management Initiatives

This strategy supports a number of initiatives to reduce the amount of single-occupancy vehicle trip making by supporting and incentivizing individuals to walk, bike, or travel by some other shared or active transportation mode. Some specific measures are provided by private operators and are assumed to be financed by the service provider (e.g., bike share services) or have dedicated funding that does not require regional investments (e.g., vanpools supported by National Transit Database funds).

Two initiatives, Targeted Transportation Alternatives (TTA) and Car Share, are assumed to receive regional investment in the Plan. TTA uses personalized incentives, education, and behavioral nudges to encourage individuals to shift to more sustainable modes. The program is assumed to require development and ongoing operating costs. The estimate to administer the program is based on costs for similar types of programs that have been developed in recent years.

To support the car share initiatives, the Plan includes investments to initiate the deployment of car share services across the region. To maximize use of and access to car share, the services will be co-located with other mobility options and will be integrated into the regional mobility hubs program.

The Plan investment for the TDM initiatives is $500 million through 2050.

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60   In addition to this program's rebates, consumers are assumed to receive additional purchase incentives through California's Clean Vehicle Rebate Project (CVRP); however, CVRP rebates (and any other EV incentives) are not part of the Plan's $5.1 billion investment.

Introduction

Plan Bay Area 2050 is the region's first long-range plan with a stand-alone, fiscally constrained housing element. Cost and revenue assumptions were developed for each strategy based upon available data and extensive consultation with housing developers, lenders, and policymakers. While these assumptions resulted from rigorous analysis, federal guidelines do not hold cost and revenue assumptions related to housing strategies to the same rigorous standard for fiscal constraint. As a result, the financial assumptions described in this section are generally less detailed than those in the transportation section of this report.

In addition, funding sources for housing are interrelated and dynamic — the amount of money available to the region to produce or preserve affordable housing depends on how much funding the region is able to generate and the pace at which it is able to permit projects. For example, tax credits and commercial debt might make up the bulk of funding for an affordable housing project, but this funding is simply unavailable without an additional subsidy from a local source such as a housing bond.

Housing Revenue Forecast

Existing Housing Revenues

Rather than establishing an individual estimate of available revenues for the Preservation and Production strategies, a single stream of funding was estimated for subsidized affordable housing, which was then allocated to each strategy based on the current breakdown of preservation and production funding. This included the following sources:

- **Federal:** Sum of a) Low-income housing tax credits (LIHTC), calculated as the average of Bay Area allocation of LIHTC funding between fiscal years 2009-10 and 2018-19, with a 1% appreciation rate to reflect uncertainty of program; and b) HUD allocations to Bay Area jurisdictions, calculated as average of Bay Area allocation of HUD funding between fiscal years 2009-10 and 2018-19, with a 1% appreciation rate to reflect uncertainty of program. **Note: LIHTC funding also allocated by state, but consolidated into sum of federal total**

- **State:** Sum of: a) Affordable Housing and Sustainable Communities (AHSC) program; b) Proposition 1; and c) No Place Like Home program. AHSC calculated by applying the Bay Area's statewide share included in the 2018-19 AHSC NOFA, rounded from $187M to $185M, with a 2.2% increase per year assuming state will extend the program to 2050 and beyond. Prop 1 and No Place Like Home—one-time programs—are calculated as being allocated over the next 10 years.

- **Local:** Sum: a) City and County Affordable Housing Bonds; and b) City and County Fees. Calculated as sum of locally adopted bonds, sales taxes, impact fees, and general fund contributions. May not fully reflect all ballot measures adopted in recent elections. Forecast assumes a 1% growth rate.

Table 43. Estimated revenues for housing strategies from existing sources

SOURCE	NUMBER OR COST	SOURCE/METHODOLOGY
Federal	$59 billion	See above text above for detailed description of sources; sum for period, 2021-2050, year of expenditure dollars.
State	$10 billion	See above text above for detailed description of sources; sum for period, 2021-2050, year of expenditure dollars.
Local	$52 billion	See above text above for detailed description of sources; sum for period, 2021-2050, year of expenditure dollars.
Total	**$122 billion**	Sum of Federal, State, and Local/Regional capital funding sources, in year of expenditure dollars, 2021-2050, with assumed cost inflation rate of 2.2%, reported in year of expenditure dollars.

COVID-19 Impacts on Revenues for Housing

Housing revenue is not expected to be heavily affected by the economic impacts of COVID-19. Federal, state and local funding estimates are based on past years' regional receipts, accounting for past recessions. However, funding opportunities, especially on the state and federal level, for near-term housing investments may in fact increase in the coming months and years.

New Revenues for Housing Strategies

A number of potential pathways could lead the region to the level of new affordable housing funding necessary to implement the plan's housing strategies. For example, if federal funding for affordable housing returned to World War II levels and the tax increment financing tools previously available to cities through redevelopment agencies were reinstated, the amount of new local revenues required could be very limited. On the other hand, if both federal and state funding for affordable housing declined, a significant amount of new local tax revenue would be required to fund the plan's housing strategies.

The cost estimates for the plan's housing strategies are informing a parallel regional effort to dramatically expand funding for Bay Area affordable housing led by the recently established Bay Area Housing Finance Authority (BAHFA)—the first regional entity in California authorized to receive, raise, and distribute funding for affordable housing. Because this effort is currently unfolding and the housing strategies, unlike transportation, are not fiscally constrained, detailed proposals for new regional funding for affordable housing were not developed. Likely sources for new revenues include new federal and state allocations, bonds issued by the Bay Area Housing Finance Authority, and supportable commercial debt. In coordination with BAHFA, the Implementation Plan is further exploring funding options.

Strategy Costs

The Plan Bay Area 2050 housing strategies were developed through the Horizon process and further refined through the Draft Blueprint and the Final Blueprint. To support the plan's guiding principles and improve performance on equity and affordability, eight housing strategies were ultimately included in the Plan.

As noted in the transportation section above, the strategies included in Plan Bay Area 2050 are neither legislative proposals nor policies or projects that MTC and ABAG alone could implement today. Rather, the purpose of strategies is to inform future deliberation and decision-making by the appropriate bodies vested with implementation authority. As such, many of the strategy costs were calculated using representative placeholders. The following section documents the assumptions that were used to arrive at the strategy costs.

The eight housing strategies can be divided between those that require little to no funding and those that are anticipated to require significant investment over the course of the plan period. The former category, focused on policies and incentives, includes: Allow a Greater Mix of Housing Densities and Types in Growth Areas; Integrate Affordable Housing into All Major Housing Projects; Transform Aging Malls and Office Parks into Neighborhoods; and Accelerate Reuse of Public and Community-Owned Land for Mixed-Income Housing and Essential Services. Although no costs are assumed for these strategies, many are critical to the success of the strategies that require significant funding. For example, the land made available through the Accelerate Reuse of Public and Community-Owned Land strategy significantly reduces the per unit cost of the Build Affordable Housing to Ensure Homes for All strategy.

Strategies that require significant funding, which are the focus of the next section, include: Further Strengthen Renter Protections Beyond State Legislation; Preserve Existing Affordable Housing; Build Adequate Affordable Housing to Ensure Homes for All; and Provide Targeted Mortgage, Rental and Small Business Assistance to Equity Priority Communities.

Protect and Preserve Affordable Housing

Strategy H1: Further Strengthen Renter Protections Beyond State Law
Building upon recent tenant protection laws, this strategy is made up of two components:

- Limit annual rent increases to the rate of inflation, while exempting units less than 10 years old, the timeframe developers and lenders analyze to determine project feasibility (Cost: N/A)

- Augment robust renter protection with expanded services such as legal assistance and strengthened enforcement of recently adopted and longstanding protections, including fair housing requirements. (Cost: $2B)

The cost estimate for the legal services and enforcement is based upon the region's most robust existing program in the City and County of San Francisco. The regional total was calculated by applying the annual per capita cost of San Francisco's program across the region. Existing revenue sources account for current programs in Alameda and San Francisco that are designed to be permanent, leaving a funding gap for the remainder of the region.

Strategy H2: Preserve Existing Affordable Housing
This strategy acquires homes currently affordable to, and/or occupied by, low-income residents for preservation as permanently deed-restricted affordable housing. This strategy is broken into two categories: a) existing deed-restricted units at risk of conversion to market rate housing; and b) existing unsubsidized units occupied by low-income households. To estimate the cost of preserving existing at-risk deed-restricted units, the number of units with expiring deed-restrictions during the plan period was multiplied by a per-unit cost estimate to acquire and preserve these units as permanently deed-restricted. To estimate the cost to preserve existing unsubsidized units occupied by low-income households, the number of low-income households in 2020 without deed-restricted homes was multiplied by a per-unit cost estimate to acquire and preserve these units as permanently deed-restricted. The typical per-unit cost estimates for these categories were established through consultation with non-profit affordable housing developers and community-development finance institutions involved in preservation projects, cost data from recent projects by local staff, and data published by the California Department of Housing and Community Development (HCD).

Table 44. Cost estimate for strategy to preserve existing affordable housing

FIGURE OR CATEGORY	NUMBER OR COST	SOURCE/METHODOLOGY
Existing at-risk subsidized affordable housing		
Number of at-risk deed-restricted units	2,900	Number of deed-restricted at-risk of conversion to market-rate housing due to expiring, 2020. Source California Housing Partnership (CHPC)
Estimated per Unit Subsidy for Preserved Unsubsidized Units (2020 dollars)	$400,000	2020 subsidy estimate from Enterprise Community Partners, based on analysis of LIHTC funded Bay Area projects between 2017-2019, taking into account supportable debt. Source data available at https://www.treasurer.ca.gov/ctcac/annual_reports.asp.
Subtotal	$13 billion	Deed-restricted units at risk of conversion, annualized over 10-year period, multiplied by estimated per unit subsidy, with assumed cost inflation rate of 2.2%, reported in year of expenditure dollars.
Unsubsidized affordable housing		
Total low-income households (quartile 1): 2020	671,000	Quartile 1 Households - 2020 population (Plan Bay Area 2050 Regional Growth Forecast)
Total estimated deed-restricted homes: 2020	130,000	Sum of: 2020 total deed-restricted units (California Housing Partnership database, 2020); and 2014-2019 permits for Low and Very-Low Income Housing Units from (ABAG, local RHNA Annual Progress Reports, 2014-2019)
Deficit in existing deed-restricted homes: 2020	541,000	Total 2020 low-income households (quartile 1) minus Total estimated deed-restricted homes (2020)
Estimated per Unit Subsidy for Preserved Unsubsidized Units (2020 dollars)	$320,000	2020 subsidy estimate from Enterprise Community Partners, based on analysis of Bay Area-wide acquisition and preservation projects for unsubsidized affordable housing. Report available at https://www.enterprisecommunity.org/resources/preserving-affordability-preventing-displacement-acquisition-rehabilitation-unsubsidized
Subtotal	$224 billion	2020 deficit of deed restricted units, annualized over 30 year period and multiplied by annualized estimated per unit subsidy, with assumed cost inflation rate of 2.2%, reported in year of expenditure dollars.
Total	**$237 billion**	

Spur Housing Production for Residents of All Income Levels

Strategy H4: Build Adequate Affordable Housing to Ensure Homes for All

This strategy builds enough new deed-restricted affordable homes necessary to fill the existing gap in homeless housing and to meet the needs of low-income households, including those currently living in overcrowded or unstable housing. Prioritize projects that advance racial equity and greenhouse gas reduction, including those in High-Resource Areas, Transit-Rich Areas, and communities facing displacement risk.

Table 45. Need for building adequate affordable housing to ensure homes for all

FIGURE OR CATEGORY	NUMBER OR COST	SOURCE/METHODOLOGY
Total growth in low-income households (quartile 1): 2020-2050 – determines need for new deed-restricted units during this period. (Does not account for homeless population)	438,000	Quartile 1 Households – 2020 and 2050 population (Plan Bay Area 2050 Regional Growth Forecast)
Estimated new deed-restricted units produced through Integrate Affordable Housing into All Major Housing Projects Strategy	134,400	Total 2020 low-income households (quartile 1) minus Total estimated deed-restricted homes (2020)
Estimated additional subsidized deed-restricted units needed	303,000	Total growth in quartile 1 households, 2020-2050, subtracted by total estimated new deed-restricted units produced during the same period.
Estimated new supportive, subsidized deed-restricted, housing units needed for existing homeless population	35,000	Sum of 2020 point in time homeless count estimates, all Bay Area Counties.
Estimated per Unit Subsidy for Preserved Unsubsidized Units (2020 dollars)	$475,000	Based upon analysis of LIHTC funded Bay Area projects between 2017-2019, taking into account supportable debt. Source: Enterprise Community Partners, using source data available at https://www.treasurer.ca.gov/ctcac/annual_reports.asp.
Estimated per Unit Subsidy for Supportive Homeless Housing Units (2020 dollars)	$350,000	Based on data from recent projects provided by San Francisco Accelerator Fund and Panoramic Interests. Assumes pre-lease agreement with supportive housing providers, per recent projects.
Total	$219 billion	Sum of: a) Estimated additional subsidized deed-restricted units needed multiplied by estimated per unit subsidy, annualized over 30 year period; and b) Estimated new supportive, subsidized deed-restricted, housing units needed for existing homeless population multiplied by estimated per unit subsidy, annualized over 10 year period. Both reported in year or expenditure dollars, with assumed per unit cost inflation of 2.2%.

Create Inclusive Communities

Strategy H7: Provide Targeted Mortgage, Rental and Small Business Assistance to Equity Priority Communities

This strategy provides mortgage and rental assistance in Equity Priority Communities, prioritizing longtime previous or existing residents of communities of color that have experienced disinvestment or displacement resulting from policies such as redlining, exclusionary zoning, predatory lending, and infrastructure siting. An additional component of this strategy providing targeted grants and low-interest loans to start and expand locally owned businesses is not included in the total as it is not housing-related.

Table 46. Needs for provide targeted mortgage, rental and small business assistance to Equity Priority Communities strategy

CATEGORY	NUMBER OR COST	SOURCE/METHODOLOGY
Emergency rental and mortgage assistance/eviction prevention		
Short-term estimate of households needing emergency assistance, 2020-2025	90,000	Estimate provided by Terner Center
Ongoing estimate of households needing emergency assistance, 2026-2050	30,000	Estimate provided by Terner Center
Subsidy per household	$4,000	Estimate provided by Terner center
Subtotal	$6.8 billion	Sum of: a) short-term need multiplied by estimated per household cost for first 5-year period; and b) ongoing need (25-year period) multiplied by per household cost. All cost assumptions annualized over 30-year period. Total reported as year of expenditure dollars.
Limited Equity Housing Cooperative		
Estimate of Households supported, start-up period, 2021-2025	500	Based on estimate of 10 pilot projects with 50 units/project
Estimate of Households supported, ongoing, 2026-2050	1,500	Based on estimate of 15 projects with 100 units/project
Subsidy per household	$7,500	Based on review of information available from Bay Area Limited Equity Housing Cooperatives in 2020. Grant amount equal to 25-100% of co-op share cost based on income and/or length of family residence in community.

CATEGORY	NUMBER OR COST	SOURCE/METHODOLOGY
Subtotal	$0.4 billion	Sum of: a) annual start-up grant subsidies multiplied by estimated per subsidy cost for first 5-year period; and b) ongoing annual subsidies (25-year period) multiplied by per household cost. All cost assumptions annualized over 30-year period. Total reported as year of expenditure dollars.
Traditional Mortgage Downpayment Grant and Forgivable Loan		
Estimated average annual households supported, 2021-2050	2,000	Based on annual target of 2,000 households
Subsidy per household	$20,500	Based on assumed home price $785,000, the average of "All Homes-bottom tier" Zillow Home Value Index for SF and SJ MSAs on 10/31/20, rounded to nearest $5,000; Assumes 25% of participants receive a grant for 3% downpayment, modelled after Fannie Mae Homepath Program for foreclosed homes, and 75% of participants require 10% downpayment with forgivable loans, with a conservative 88% repayment rate, based on the Freddie Mac "credit event" rate during the Great Recession--the first 7 years since origination for loans originated in 2007. Source: Urban Institute.
Subtotal	$1.7 billion	Estimated average annual households supported multiplied by estimated average subsidy, annualized over 30 year period. Total reported as year of expenditure dollars.
Total	**$9 billion**	

Introduction

Plan Bay Area 2050 is the region's first long-range plan with a stand-alone, fiscally constrained economy element. Cost and revenue assumptions were developed for each strategy based upon available data, though estimates remain highly sketch-level due to the lack of precedent programs investing in economic development here in the Bay Area and in other peer metropolitan areas. More work is needed to develop the institutional capacity to understand the costs of such strategies and the resource landscape at MTC and ABAG.

Economy Revenue Forecast

Given the limited information available on public funding programs for economic development at the federal, state and local levels, Plan Bay Area 2050 did not incorporate an assessment of existing revenues available for investment through the economy element. As such, all of the strategies are assumed to rely on new revenues, though in actuality, some public funding streams would exist to make the economic strategies a reality.

Strategy Costs

Improve Economic Mobility

Strategy EC1: Implement a Statewide Universal Basic Income (Bay Area Cost Portion)

This strategy assumes that $500 per month would go to each Bay Area household. However, as a simplifying assumption, the strategy only accounts for the cost of providing the subsidy to households earning below $45,000 per year, as moderate- and higher-income households would see an increase in taxes to pay for the program that would cancel out any public cost. The assumed start year was 2030.

To estimate the cost of the strategy, the forecasted number of eligible households for a given five-year increment (assumed to be constant for the prior two years and following two years) was multiplied by 500 and by the number of years in the period. Annual costs were converted into year-of-expenditure dollars using a 2.2% annual inflation rate. Table 44 summarizes the cost calculation by year.

Table 44. Cost estimates for Bay Area portion of statewide Universal Basic Income strategy

Period	Number of Eligible Low-Income Households	Payment per Household	Cost for Period (Billions of Year-of-Expenditure Dollars)
2030-2032	881,000	$500	$20
2033-2037	974,000	$500	$40
2038-2042	1,041,000	$500	$48
2043-2047	1,094,000	$500	$57
2048-2050	1,143,000	$500	$40
Total Cost			**$205**

Strategy EC2: Expand Job Training and Incubator Programs

This strategy assumes 30 incubator programs/job training centers throughout the region's Priority Production Areas. The cost of the strategy is based on an assumed $100 million annual lifecycle cost ($3 billion over the 30-year course of the plan) for incubators plus around $1.7 billion in staffing costs for the job training programs ($45 million annual cost). Costs were adjusted for inflation.

Strategy EC3: Invest in High-Speed Internet in Underserved Low-Income Communities

This strategy assumes a $20 monthly subsidy to all households earning below $45,000 per year, which is roughly equivalent to the cost of means-based internet service currently provided by internet service providers like Comcast. The number of qualifying households was sourced from the Regional Growth Forecast in five-year increments. Costs were based using the assumption that the strategy would be implemented in 2021.

Shift the Location of Jobs

Strategy EC5: Provide Incentives to Employers to Shift Jobs to Housing-Rich Areas Well Served by Transit

An assumed cost of $10 billion in new tax revenues was used for this strategy, which is approximately two to four times larger than the fee revenues generated under the Draft Blueprint strategy to assess transportation impact fees on new office developments. The Draft Blueprint fee strategy was not carried over into the Final Blueprint, based on public input to pursue incentives rather than disincentives.

Strategy EC6: Retain Key Industrial Lands through the Establishment of Priority Production Areas

An annual placeholder amount of $100 million, converted to year-of-expenditure dollars to avoid loss of purchasing power due to inflation, was reserved to fund non-transportation infrastructure upgrades to Priority Production Areas. This strategy was assumed to start in 2021.

METROPOLITAN TRANSPORTATION COMMISSION
ASSOCIATION OF BAY AREA GOVERNMENTS

PLAN BAY AREA 2050

Plan Bay Area 2050 Final Blueprint: Strategy Descriptions

To advance the Plan Bay Area 2050 Vision of a more affordable, connected, diverse, healthy, and vibrant Bay Area for all, the Final Blueprint includes strategies under the four core elements of the Plan: Transportation, Housing, the Economy, and the Environment. In total, there are 35 strategies, defined as policies or bundles of investments, clustered under eleven categories:
- **Transportation**: Maintain and Operate the Existing System
- **Transportation**: Create Healthy and Safe Streets
- **Transportation**: Build a Next-Generation Transit Network
- **Housing**: Protect and Preserve Affordable Housing
- **Housing**: Spur Housing Production of All Income Levels
- **Housing**: Create Inclusive Communities
- **Economy**: Improve Economic Mobility
- **Economy**: Shift the Location of Jobs
- **Environment**: Reduce Risks From Hazards
- **Environment**: Expand Access to Parks and Open Space
- **Environment**: Reduce Climate Emissions

For each strategy, this attachment identifies the following:
- **Strategy Cost.** The lifecycle cost of this strategy, in year-of-expenditure dollars, regardless of the implementing organization (local, regional, state).
- **Strategy Objective.** The primary goal(s) of this strategy.
- **Strategy Description.** The descriptive details associated with this strategy.
- **Changes Since Draft Blueprint.** Brief description of changes to strategy scope or cost since Draft Blueprint phase, underscoring the rationale for new strategies when applicable.

This document reflects the action taken by the Metropolitan Transportation Commission and ABAG Executive Board to approve the Plan Bay Area 2050 Final Blueprint strategies in fall 2020. Minor technical revisions that occurred following adoption are depicted in redline.

Transportation: Maintain and Optimize the Existing System

Strategy T1:
Restore, Operate and Maintain the Existing System

Strategy Cost	$~~390~~389 billion
Strategy Objective	Provide a strong baseline upon which new transportation strategies in the Final Blueprint can build. This includes ensuring that the region's road and transit assets are kept in a condition that is similar to what we have in the Bay Area today and that transit service hours are returned to 2019 levels by 2035.
Strategy Description	Set aside the funding required to maintain existing conditions for freeways, bridges, local streets, and transit assets and to operate the same number of transit service hours that were in operation as of 2019, accelerating the recovery of transit service from reduced service in effect during the COVID-19 pandemic. This strategy would include investments that make transit stations and vehicles safer, cleaner, and more accessible – with investments targeted at meeting the needs of transit-dependent or limited mobility passengers. In instances where the Draft Blueprint identified potential high levels of transit crowding or slowed bus speeds due to congestion, apply targeted investments like frequency boosts, transit-only lanes, or transit signal priority to alleviate crowding or delay.
Changes Since Draft Blueprint	Two strategies discussed at the July 2020 Commission meeting, *Operate and Maintain the Existing System* and *Restore Transit Service to Pre-COVID Levels*, were merged into one. This acknowledges that, as the region continues its recovery from COVID-19, there is an opportunity to bring back an existing system that provides a higher quality of service to transit riders.

This document reflects the action taken by the Metropolitan Transportation Commission and ABAG Executive Board to approve the Plan Bay Area 2050 Final Blueprint strategies in fall 2020. Minor technical revisions that occurred following adoption are depicted in redline.

Transportation: Maintain and Optimize the Existing System

Strategy T2:
Support Community-Led Transportation Enhancements in Equity Priority Communities

Strategy Cost	$8 billion
Strategy Objective	Address historic disinvestment in minority and low-income communities through the advancement of locally-identified transportation priority projects.
Strategy Description	Build upon existing regional efforts like the Participatory Budgeting pilots in Vallejo and San Francisco and MTC/ABAG's Community-Based Transportation Plan program by creating an expanded funding source for transportation priorities identified by historically marginalized communities. Such investments could include lighting and safety measures, improvements to transit stations and stops, and subsidies for shared mobility like bike share or car share, while advancing racial equity.
Changes Since Draft Blueprint	This strategy was not included in the Draft Blueprint and emerged from public engagement in recent months. The proposed strategy focuses on cost-effective solutions to community transportation needs, making it more resilient to an uncertain future; the strategy also strongly supports Plan Bay Area 2050 equity goals.

This document reflects the action taken by the Metropolitan Transportation Commission and ABAG Executive Board to approve the Plan Bay Area 2050 Final Blueprint strategies in fall 2020. Minor technical revisions that occurred following adoption are depicted in redline.

Transportation: Maintain and Optimize the Existing System

Strategy T3:
Enable a Seamless Mobility Experience

Strategy Cost	$3 billion
Strategy Objective	Increase the viability and attractiveness of non-single-occupancy vehicle travel, including transit, shared TNC, walking, and biking, by removing the barriers to using these modes that come from having a fragmented regional network of mobility options.
Strategy Description	Reduce the friction of taking multi-operator or multi-modal trips by integrating every step of the travel process, from trip planning and fare payment to schedule coordination to smoother transfers between operators at key transfer nodes. Key elements of this strategy could include a smartphone app for trip planning, payment, and real-time passenger information, a unified transportation wallet that can be used to pay for all mobility services, cross-operator schedule coordination to reduce transfer wait times at timed transfer locations, and capital improvements ranging from wayfinding signage to station upgrades to make transfers faster and simpler.
Changes Since Draft Blueprint	This strategy's scope was expanded to encompass wayfinding signage, real-time passenger information and schedule coordination at timed transfer locations.

Transportation: Maintain and Optimize the Existing System

Strategy T4:
Reform Regional Fare Policy

Strategy Cost	$10 billion
	Fare integration component is revenue-neutral due to incentivized growth in transit trips, but means-based fare discount leads to cost listed above.
Strategy Objective	Reduce the cost burden of taking transit for all riders, particularly those with low household incomes.
Strategy Description	Streamline fare structures across the region's 27 transit operators and replace existing operator-specific discount fare programs with an integrated fare structure across all transit operators and a regional means-based fare discount. The regional integrated fare structure would consist of a flat local fare with free transfers across operators and a distance or zone-based fare for regional trips, with discounts for youth, people with disabilities, and very low-income people.
Changes Since Draft Blueprint	None

Transportation: Maintain and Optimize the Existing System

Strategy T5:
Implement Per-Mile Tolling on Congested Freeways with Transit Alternatives

Strategy Cost	$1 billion *(in costs to construct related infrastructure)*
	Generates at least $25 billion in revenues to fund Transportation Element
Strategy Objective	Reduce traffic congestion and greenhouse gas emissions by de-incentivizing auto use, particularly during periods of peak demand and by single- or zero-occupant vehicles, while simultaneously generating revenue to fund improvements to transportation services.
Strategy Description	Apply a per-mile charge on auto travel on congested freeway corridors where transit alternatives exist today or through major planned investments before 2035 (BART, Caltrain, SMART, Valley Link, VTA Light Rail, and Regional Express Bus), with revenues directed toward transportation investments serving the corridor. Drivers on priced corridors would pay a higher charge during the morning and evening peak periods, with discounts for off-peak travel, carpools with three or more occupants, or travelers with a qualifying disability. Toll rates would be similar to the Draft Blueprint, with 15 cents per mile for solo travel in peak periods and 5 cents per mile for travelers in discount categories above. To offset the regressive nature of road pricing, lower-income drivers would be charged a discounted per-mile rate. Bridge tolls would remain in effect, with no per-mile toll on the bridges. Express Lanes on corridors without a transit alternative would continue to operate, while Express Lanes on tolled corridors would revert to carpool lanes.
Changes Since Draft Blueprint	In order to close the greenhouse gas emissions gap given the addition of new freeway strategies into the Final Blueprint – this strategy was expanded to additional corridors including Interstate 580 (Alameda), U.S. Route 101 (Marin and Sonoma), U.S. Route 101 (Santa Clara), State Route 237 (Santa Clara) and Interstate 80 (Solano).

Transportation: Maintain and Optimize the Existing System

Strategy T6:
Improve Interchanges and Address Highway Bottlenecks

Strategy Cost	$~~11~~12 billion
Strategy Objective	Implement operational improvements and select highway widenings to improve safety and achieve short-to-medium term reductions in traffic congestion.
Strategy Description	Fund a package of projects targeted at reducing congestion, reducing collisions, and improving operational efficiency of interchanges. For projects with a widening component, complementary strategies would help to offset the adverse greenhouse gas emission effects of these projects, including pricing and speed limit reductions.
Changes Since Draft Blueprint	This strategy was not included in the Draft Blueprint due to performance shortcomings identified in the predecessor Horizon initiative. Through the commitment letter process, staff worked with county transportation agencies (CTAs) to modify project scopes and seek support of complementary policies to improve performance. Full details on projects included in the Final Blueprint can be found in the ~~Draft~~ Plan Bay Area 2050 Transportation Project List.

Transportation: Maintain and Optimize the Existing System

Strategy T7:
Advance Other Regional Programs and Local Priorities

Strategy Cost	$~~18~~17 billion
Strategy Objective	Implement local priority projects that address community transportation needs and fund regional programs ranging from Clipper to 511.
Strategy Description	Fund the implementation of complementary programs and minor transportation investments at the regional and local levels. Examples of regional programs included within this strategy include the climate initiatives program, 511 traveler information services, and the Priority Development Area implementation program. Local initiatives include county-driven planning efforts, emissions reductions strategy, intelligent transportation systems projects, and minor local road and intersection improvement projects.
Changes Since Draft Blueprint	This strategy was included in the Draft Blueprint as it integrates a suite of smaller-scale transportation projects and programs not evaluated through the Horizon initiative. Full details on projects included in the Final Blueprint can be found in the ~~Draft~~ Plan Bay Area 2050 Transportation Project List.

Transportation: Create Healthy and Safe Streets

Strategy T8:
Build a Complete Streets Network

Strategy Cost	$13 billion
Strategy Objective	Encourage more biking and walking for all trip purposes and make biking and walking safer.
Strategy Description	Enhance streets to promote walking, biking, and other micromobility through by (1) building out a contiguous regional network of 10,000 miles of bike lanes or multi-use paths, (2) providing support to local jurisdictions to maintain and expand car-free slow streets, and (3) supporting other amenities like improved lighting, safer intersections, and secure bike parking at transit stations. This strategy would emphasize Complete Streets improvements near transit to improve access and in Equity Priority Communities to advance equity outcomes.
Changes Since Draft Blueprint	This strategy's funding was augmented by the addition of county budget commitments towards this strategy, expanding the total miles of new bicycle infrastructure by nearly 50 percent.

Transportation: Create Healthy and Safe Streets

Strategy T9:
Advance Regional Vision Zero Policy through Street Design and Reduced Speeds

Strategy Cost	$4 billion
Strategy Objective	Reduce the number and severity of crashes, leading to fewer fatalities and serious injuries on all roads. On freeways, reduce emissions by capping speed limits at their most efficient, lowest GHG producing levels.
Strategy Description	Reduce speed limits to between 20 and 35 miles per hour on arterials and local streets, depending on the setting, and 55 miles per hour on freeways. Enforce lower speeds using design elements like speed bumps, lane narrowings, and intersection bulbouts on local streets and automated speed enforcement on freeways and local roads as needed, with a special emphasis on enforcement near schools, community centers, and parks. Engage with local communities to identify priority locations for enforcement, and reinvest revenues generated from violation fines into safety initiatives, including education and capital investments.
Changes Since Draft Blueprint	This strategy's funding was augmented by the addition of county budget commitments towards programmatic categories related to road diets and safety and security projects.

Transportation: Build a Next-Generation Transit Network

Strategy T10:
Enhance Local Transit Frequency, Capacity, and Reliability

Strategy Cost	$~~31~~32 billion
Strategy Objective	Invest in projects that improve accessibility for lower-income transit riders and increase the use of transit for local trips.
Strategy Description	Improve the quality and availability of local bus and light rail service, with a focus on projects that meet the transportation needs of the region's lower-income residents. Projects nested within this strategy include capital improvements that make bus travel faster and more reliable – such as bus rapid transit and transit signal priority – as well as service increases on bus systems throughout the region, extensions of the light rail network in the South Bay to accommodate future growth in population, jobs, and transportation demand, and investments that ensure sufficient service levels in all of the region's Priority Development Areas.
Changes Since Draft Blueprint	This strategy's list of local transit projects was expanded beyond the highly limited set of projects included in the Draft Blueprint, as a result of project refinements through the commitment letter process. Example projects included in the Final Blueprint include AC Transit Rapid Network, Transit Signal Priority in Napa and San Mateo counties, Stevens Creek Rail, SJC Airport APM, VTA Light Rail Modernization, and BRT infrastructure in Solano County. Full details on projects included in the Final Blueprint can be found in the ~~Draft~~ Plan Bay Area 2050 Transportation Project List.

Transportation: Build a Next-Generation Transit Network

Strategy T11:
Expand and Modernize the Regional Rail Network

Strategy Cost	$81 billion
Strategy Objective	Increase the attractiveness and availability of rail as an option for regional and interregional trips, reducing greenhouse gas emissions through a shift from auto to transit travel.
Strategy Description	Strategically invest in a coordinated suite of projects that extend the regional rail network and increase frequencies and capacity to address peak-hour crowding. This strategy envisions a new Transbay rail crossing linking Oakland and San Francisco, with complementary rail extensions connecting Caltrain and High-Speed Rail to Salesforce Transit Center, BART to Diridon Station, and the Central Valley to the Bay Area via Valley Link. Furthermore, this strategy funds capital improvements such as electrification, grade separation and other modernization projects along the Caltrain corridor, prioritizing dual-purpose investments from south to north that help to connect High-Speed Rail to the Bay Area. Service frequency boosts on the Altamont Corridor Express, BART, and Caltrain reduce crowding and wait times for rail passengers. To add redundancy and capacity for regional transit trips, also invest in select water transit enhancements, including ferry service frequency boosts and new routes serving Treasure Island, Berkeley, Foster City, and Redwood City.
Changes Since Draft Blueprint	This strategy's list of rail projects was expanded beyond the highly limited set of projects included in the Draft Blueprint, as a result of project refinements through the commitment letter process. This strategy also integrates the *Build a New Transbay Rail Crossing* strategy from the Draft Blueprint. Example projects now included in the Final Blueprint include BART to Silicon Valley Phase 2, Valley Link, Caltrain Enhanced Growth, Dumbarton Group Rapid Transit, ACE Frequency Boost, and Caltrain/HSR Capital Improvements. Full details on projects included in the Final Blueprint can be found in the ~~Draft~~ Plan Bay Area 2050 Transportation Project List.

Transportation: Build a Next-Generation Transit Network

Strategy T12:
Build an Integrated Regional Express Lanes and Express Bus Network

Strategy Cost	$9 billion
Strategy Objective	Increase the time-competitiveness of carpooling and express bus when compared to single-occupancy vehicle travel, incentivizing a shift toward these more sustainable modes of travel.
Strategy Description	Complete the buildout of the Express Lanes network, providing an uncongested freeway lane for buses, carpoolers, and toll-paying single- or zero-occupant vehicles. Where possible, convert existing carpool or general-purpose lanes to Express Lanes. When widening is required, complementary strategies help to offset the adverse effects of these projects, including pricing and speed limit reductions. Further leverage this investment through the provision of new Regional Express Bus routes serving destinations in 6 of the 9 Bay Area counties and by boosting frequencies on existing Express Bus service from Napa VINE, AC Transit, and other operators.
Changes Since Draft Blueprint	This strategy was not included in the Draft Blueprint due to performance shortcomings identified in the predecessor Horizon initiative. Through the commitment letter process, staff worked with county transportation agencies (CTAs) to modify project scopes and seek support of complementary policies to improve performance. Full details on projects included in the Final Blueprint can be found in the ~~Draft~~ Plan Bay Area 2050 Transportation Project List.

Housing: Protect and Preserve Affordable Housing

Strategy H1:
Further Strengthen Renter Protections Beyond State Law

Strategy Cost	$2 billion
Strategy Objective	Increase housing security for existing and future low and middle-income households while ensuring residential development remains feasible.
Strategy Description	Building upon recent tenant protection laws, limit annual rent increases to the rate of inflation, while exempting units less than 10 years old, the timeframe developers and lenders analyze to determine project feasibility. Augment robust renter protection with expanded services such as legal assistance and strengthened enforcement of recently adopted and longstanding protections, including fair housing requirements.
Changes Since Draft Blueprint	This strategy was updated to integrate expanded services to augment strengthened renter protections. These were formerly part of the *Fund Affordable Housing Protection, Preservation and Production* strategy.

Housing: Protect and Preserve Affordable Housing

Strategy H2:
Preserve Existing Affordable Housing

Strategy Cost	$237 billion[1]
Strategy Objective	Increase housing security and expand pathways to home ownership for low- and middle-income households.
Strategy Description	Acquire homes currently affordable to low-and middle-income residents for preservation as permanently deed-restricted affordable housing. Preserve all *existing deed-restricted units* that are at risk of conversion to market rate housing. Pursue tax incentives, targeted subsidies, favorable financing, and other strategies to transfer ownership of *units without deed-restrictions* (also known as "naturally occurring affordable housing") to individual tenants, housing cooperatives, or public or non-profit housing organizations including community land trusts for preservation as permanently affordable housing.
Changes Since Draft Blueprint	This strategy was included in the Draft Blueprint as part of the *Fund Affordable Housing Protection, Preservation and Production* strategy. That strategy has been expanded into two distinct but complementary strategies – this one, which focuses on preservation of existing subsidized and unsubsidized affordable housing, and *Build Adequate Affordable Housing to Ensure Homes for All*, shown below, which focuses on production of new deed-restricted affordable housing. The protection element of the previous strategy is integrated into the *Strengthen Renter Protections* strategy.

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[1] Calculated by estimating the subsidy required to preserve as permanently affordable: a) all deed-restricted housing units at risk of conversion to market rate housing, and b) enough additional existing units without deed-restrictions to overcome the current deficit in deed-restricted housing affordable to households in the lowest income quantile. Affordability is defined here as monthly housing costs that do not exceed one-third of a household's gross monthly income. The amount of additional subsidy required is calculated as the total estimated subsidy minus a share of existing and anticipated affordable housing subsidies from federal, state, and local sources. Potential sources for new revenues are assumed to include a combination of a bonds issued by the Bay Area Housing Finance Authority, existing and potential new state and federal sources, and supportable commercial debt; opportunities for new revenues can be further explored in the Implementation Plan phase.

Housing: Spur Housing Production for Residents of All Income Levels

Strategy H3:
Allow a Greater Mix of Housing Densities and Types in Blueprint Growth Geographies

Strategy Cost	*not applicable*
Strategy Objective	Enable increased production of a full range of housing types and tenures, prioritizing Growth Geographies in the adopted Blueprint with access to the region's best public transit, schools, and community services.
Strategy Description	Allow a variety of housing types at a range of densities to be built in Blueprint Growth Geographies, including Priority Development Areas (PDAs) identified by local governments, High Resource Areas (HRAs) with the region's best schools and economic opportunities, and Transit Rich Areas (TRAs) with convenient access to frequent public transportation. Furthermore, reduce project review times and parking requirements, with 100% affordable projects permitted "by-right." Specific densities and housing types are based upon regional and local context, including local zoning, type and frequency of transit service, existing land uses, and access to jobs and other opportunities.
Changes Since Draft Blueprint	This strategy was modified to adjust the densities and housing types by Growth Geographies. Also integrate the Draft Blueprint strategy *Reduce Barriers to Housing Near Transit and in Areas of High Opportunity*, and to include further reductions in barriers to 100% affordable housing.

Housing: Spur Housing Production for Residents of All Income Levels

Strategy H4:
Build Adequate Affordable Housing to Ensure Homes for All

Strategy Cost	$219 billion[2]
Strategy Objective	Ensure low-income households, including the currently unhoused, have access to affordable, secure housing.
Strategy Description	Build enough deed-restricted affordable homes necessary to fill the existing gap in homeless housing and to meet the needs of low-income households, including those currently living in overcrowded or unstable housing. Prioritize projects that advance racial equity and greenhouse gas reduction, including those in High Resource Areas, Transit Rich Areas, and communities facing displacement risk.
Changes Since Draft Blueprint	This strategy was included in the Draft Blueprint as part of the *Fund Affordable Housing Protection, Preservation and Production* strategy. That strategy was expanded into two distinct but complementary strategies – this one, which focuses on production of new deed-restricted affordable housing, and *Preserve Existing Affordable Housing*, shown above. The protection element of the previous strategy is integrated into the *Strengthen Renter Protections* strategy. To respond to a desire for stronger action on affordable housing, this strategy adds the estimated amount of subsidy required to meet full future housing needs.

[2] Calculated by estimating subsidy required to meet forecasted need for new deed-restricted affordable housing resulting from growth in lowest income quantile households over the course of the Plan and to close the existing gap in homeless housing. The amount of additional subsidy required is calculated as the total estimated subsidy minus a share of existing and anticipated affordable housing subsidies from federal, state, and local sources. Potential sources for new revenues are assumed to include a combination of bonds issued by the Bay Area Housing Finance Authority, existing and potential new state and federal sources, and supportable commercial debt; opportunities for new revenues can be further explored in the Implementation Plan phase.

Housing: Spur Housing Production for Residents of All Income Levels

Strategy H5:
Integrate Affordable Housing into All Major Housing Projects

Strategy Cost	*not applicable*
Strategy Objective	To create more inclusive communities, ensure new housing projects integrate households at a variety of income levels, while allowing residential development, including Accessory Dwelling Units, to remain financially feasible.
Strategy Description	Require a baseline of 10 percent to 20 percent of new market-rate housing developments of 5 units or more to be permanently deed-restricted affordable to low-income households[3], with the threshold determined by local real estate market strength, access to opportunity, public transit, and displacement risk. Smaller units, such as Accessory Dwelling Units (ADUs) and fourplexes, are exempted to increase feasibility.
Changes Since Draft Blueprint	Strategy name has been modified to highlight intention of advancing inclusive communities.

[3] Assumes requirement is met through on-site affordable units, as opposed to payments to an "*in lieu*" affordable housing fund.

Housing: Spur Housing Production for Residents of All Income Levels

Strategy H6:
Transform Aging Malls and Office Parks into Neighborhoods

Strategy Cost	*not applicable*
Strategy Objective	Reinvent 20th century malls and office parks as complete communities with mixed-income housing, local and regional services, and public spaces.
Strategy Description	Permit and promote the reuse of shopping malls and office parks with limited commercial viability as neighborhoods with housing at all income levels, local and regional services, and public spaces. Support projects within Transit-Rich and High Resource Areas that exceed deed-restricted affordable housing requirements by providing technical assistance and low-interest loans. Prioritize a handful of regional pilot projects that add 1,000+ homes and dedicate land for affordable housing and public institutions such as community colleges and university extensions.
Changes Since Draft Blueprint	None

Housing: Create Inclusive Communities

Strategy H7:
Provide Targeted Mortgage, Rental, and Small Business Assistance to Equity Priority Communities

Strategy Cost	$10 billion
Strategy Objective	Begin to redress the impact of race-based policies on communities of color by increasing housing security and opportunities to build intergenerational wealth through housing and entrepreneurship.
Strategy Description	Provide mortgage and rental assistance in Equity Priority Communities, prioritizing longtime previous or existing residents of communities of color that have experienced disinvestment or displacement resulting from policies such as redlining, exclusionary zoning, predatory lending, and infrastructure siting. Provide targeted grants and low-interest loans to start up and expand locally-owned businesses.
Changes Since Draft Blueprint	This strategy was not included in the Draft Blueprint and emerged from public engagement in recent months. The proposed strategy focuses funding to reverse the effects of discriminatory policies in the 20th century, making it highly resilient to an uncertain future and strongly supportive of equity goals.

Housing: Create Inclusive Communities

Strategy H8:
Accelerate Reuse of Public and Community Land for Mixed-Income Housing and Essential Services

Strategy Cost	*not applicable*
Strategy Objective	Accelerate the reuse of surplus public land and land owned by non-profit institutions to meet community housing and service needs, expand small business opportunities, and create community gathering spaces.
Strategy Description	Establish a regional network of land owned by public agencies, community land trusts, and other non-profit land owners and coordinate its reuse as deed-restricted mixed-income affordable housing, essential services, and public spaces. Align with the *Build Adequate Affordable Housing to Ensure Homes for All* and *Provide Targeted Mortgage, Rental,* and *Small Business Assistance* strategies to match sites with funding, developers, and service providers, and to ensure projects benefit communities of color and other historically disinvested communities.
Changes Since Draft Blueprint	This strategy was not included in the Draft Blueprint and emerged from public engagement in recent months, as another means to preserve and produce more deed-restricted affordable housing. The proposed strategy is resilient with uncertain future economic conditions and works to advance equity goals of Plan Bay Area 2050.

Economy: Improve Economic Mobility

Strategy EC1:
Implement a Statewide Universal Basic Income

Strategy Cost	$205 billion *Note that cost is solely reflective of funding for low-income households within the Bay Area; all other households see equivalent tax increases that net out any gains from the universal basic income.*
Strategy Objective	To enable upward economic mobility for low-income families by improving family stability & health and increasing consumer spending.
Strategy Description	Provide an average payment of $500 a month to all households in the Bay Area *(payments vary based upon household size and composition)*, paired with tax increases for those outside the low-income tax bracket that offset any gains from this strategy. Although a small amount such as $500 cannot make up for a lost job, it can and does help with everyday emergencies, reduce anxiety, improve family stability, health, and improve access to opportunity.
Changes Since Draft Blueprint	This strategy was not included in the Draft Blueprint and serves as a broader replacement for the childcare strategy previously featured. A universal basic income would be resilient to uncertain future economic conditions, and the program's design would help to advance equitable outcomes in the Bay Area and beyond.

Economy: Improve Economic Mobility

Strategy EC2:
Expand Job Training and Incubator Programs

Strategy Cost	$5 billion
Strategy Objective	To prepare workers for middle-wage job opportunities and to create new small businesses in communities with more limited employment opportunities today.
Strategy Description	Fund technical assistance for establishing a new business, access to workspaces, mentorship and financing through a series of co-located business incubation and job training centers. Support training for high-growth in demand occupations in collaboration with local community colleges in disadvantaged communities, working with community colleges and other training partners. Incubators would be co-located in select Priority Production Areas in housing-rich locations to encourage job opportunities are focused in support of locational objectives as well.
Changes Since Draft Blueprint	This strategy was expanded to integrate job training components elevated through the stakeholder engagement process and in alignment with the Comprehensive Economic Development Study (CEDS).

Economy: Improve Economic Mobility

Strategy EC3:
Invest in High-Speed Internet in Underserved Low-Income Communities

Strategy Cost	$10 billion
Strategy Objective	Enable greater participation in the digital economy and improve residents' ability to telecommute and school age children's access to educational resources.
Strategy Description	Connect low-income communities with high-speed internet to broaden opportunities through (1) direct subsidies for internet access to reduce costs for low-income households to $0 per month and/or (2) invest in public infrastructure to create additional high-speed fiber connections. This strategy is designed to be complementary to the telecommuting strategy featured in the Environment Element, while recognizing that internet connectivity benefits extend telework. Given the immediate needs during and after the COVID-19 pandemic, this strategy addresses near-term needs while supporting a more equitable long-term future.
Changes Since Draft Blueprint	This strategy was not included in the Draft Blueprint and serves as a critical strategy to complement efforts to expand telecommuting. As the internet has become a more critical tool during these uncertain times, these investments would boost resilience to an uncertain future and focus primarily on advancing equity through improved access.

Economy: Shift the Location of Jobs

Strategy EC4:
Allow Greater Commercial Densities in Growth Geographies

Strategy Cost	*Not applicable*
Strategy Objective	To enable additional office, retail, and other commercial uses in locations with the best transit access in order to reduce greenhouse gas emissions.
Strategy Description	Allow greater densities for new commercial development in select Priority Development Areas and select Transit-Rich Areas to encourage more jobs to locate near public transit. This strategy supports focused growth near transit to support climate goals, while recognizing the need for a balanced approach that does not exacerbate the region's jobs-housing imbalance.
Changes Since Draft Blueprint	This strategy features minor updates to the upzoning approach to encourage more job growth in low-VMT areas without adversely impacting jobs-housing balance.

Economy: Shift the Location of Jobs

Strategy EC5:
Provide Incentives to Employers to Shift Jobs to Housing-Rich Areas Well Served by Transit

Strategy Cost	$10 billion
Strategy Objective	To encourage development of new office buildings in housing-rich, transit-oriented locations.
Strategy Description	Provide a subsidy from new tax revenues that encourages employers to locate in housing-rich areas near existing transit, (e.g. Concord or San Leandro). Subsidies would be used to incentivize development at existing regional rail stations to improve jobs housing balance and reverse commuting and support new transit where auto trips tend to be shorter, and there are many more homes than jobs.
Changes Since Draft Blueprint	This incentive-based strategy replaces two fee-based strategies from the Draft Blueprint that achieved only limited gains in shifting the location of jobs. The expanded strategy, which relies on a broader tax increase rather than new development fees, is more responsive to public and stakeholder feedback about a "carrot"-based approach.

Economy: Shift the Location of Jobs

Strategy EC6:
Retain and Invest in Key Industrial Lands

Strategy Cost	$4 billion
Strategy Objective	To support and grow production, advanced manufacturing, distribution, and related businesses and middle-wage jobs located on industrial lands.
Strategy Description	Implement local land use policies to retain key industrial lands identified as Priority Production Areas. This would include preservation of industrial zoning and an assumed increase in development capacity to enable new development to "pencil out" in these zones, without competition from residential and other commercial uses. It would also provide limited annual funding for high-growth PPAs for non-transportation infrastructure improvements including fiber, broadband, and building improvements.
Changes Since Draft Blueprint	This strategy was augmented with select infrastructure improvements in Priority Production Areas, in particular to assist PPAs that did not see significant employment growth in the Draft Blueprint.

Environment: Reduce Risks From Hazards

Strategy EN1:
Adapt to Sea Level Rise

Strategy Cost	$19 billion
Strategy Objective	Ensure that the region proactively addresses inundation risks to communities and regional systems as sea levels rise over the coming decades.
Strategy Description	Address adaptation needs in locations that are permanently inundated with less than two feet of sea level rise providing protection from king tides and storms. Protect shoreline communities, prioritizing areas of low costs and high benefits and providing additional support to vulnerable populations. Using anticipated ($3 billion) and new revenues ($16 billion), the strategy would fund a suite of protective strategies (e.g. ecotone levees, traditional levees, sea walls), marsh restoration and adaptation, the elevation of critical infrastructure and support some lower density communities with managed retreat. The strategy prioritizes nature-based actions and resources in Equity Priority Communities as well as areas of high impacts and low costs. The adaptation actions are intended to balance multiple goals of flood protection, habitat restoration, and public access – protecting existing and future communities while also dedicating sufficient funds to support the 100,000 acre marsh restoration goal for the region.
Changes Since Draft Blueprint	This strategy has been augmented with funding to support strategic retreat in a small number of communities where sea level rise protections are not financially feasible.

Environment: Reduce Risks From Hazards

Strategy EN2:
Provide Means-Based Financial Support to Retrofit Existing Residential Buildings

Strategy Cost	$15 billion
Strategy Objective	Preserve the Bay Area's existing, most-vulnerable housing from earthquakes and fire while also reducing the water, energy, and carbon footprint of our least efficient, older buildings.
Strategy Description	Adopt building ordinances and incentivize retrofits to bring existing buildings up to higher seismic, wildfire, water and energy standards, providing means-based subsidies to offset costs. To ease the burden of residential building retrofits, this strategy would prioritize assistance to Equity Priority Communities, multi-family structures, as well as for residential dwellings built before current codes. Seismic improvements would focus action in 385,000 housing units with likely crawl space and soft story deficiencies for which retrofit standards exist. 125,000 homes would be retrofit with proven fire-resistant roofing and defensible space retrofits. 650,000 units would be boosted by energy efficiency and electrification subsidies and 175,000 units would undergo water efficiency and in-building, safer plumbing measures. The combined strategies reduce risk, improve affordability through lower utility and insurance bills, and reduce building-sector related emissions and water use.
Changes Since Draft Blueprint	None

Environment: Reduce Risks From Hazards

Strategy EN3:
Fund Energy Upgrades to Enable Carbon-Neutrality in All Existing Commercial and Public Buildings

Strategy Cost	$18 billion
Strategy Objective	Reduce the carbon footprint and enable full decarbonization of buildings that support essential services, community resources, and government operations.
Strategy Description	Support electrification and resilient power system upgrades in all public and commercial buildings. To reach longer-term greenhouse gas emissions goals communities need to eliminate natural gas. As building components reach the end of their useful life funds can be used to transition to electric building systems. Subsidies would make up the difference in cost for higher efficiency electric building systems, and full costs of enabling components like panel upgrades and necessary building modifications. As these investments are made, backup energy systems like microgrids and solar-plus-storage solutions can be paired to ensure buildings remain open during acute events or power shut off events. Focusing action on these buildings in the near term will help advance action in community facilities and help local governments adopt broader resilient, sustainable, and equitable energy policy.
Changes Since Draft Blueprint	This strategy was not included in the Draft Blueprint and serves as a critical strategy to complement efforts to reduce emissions from the transportation sector. This strategy would work to advance equity by focusing investments in under-resourced communities first, creating long-term job opportunities in the green economy. These crucial investments would enable complementary improvements in transportation charging, as well as backup energy systems that would increase resilience to a wide range of natural disasters occurring at greater frequency in recent years.

Environment: Expand Access to Parks and Open Space

Strategy EN4:
Maintain Urban Growth Boundaries

Strategy Cost	*Not applicable*
Strategy Objective	To direct all new growth within the region's existing urban footprint or growth boundaries in order to prevent the conversion of agricultural and open space lands to higher greenhouse gas emitting uses.
Strategy Description	Using 2020 urban growth boundaries and other existing environmental protections, confine new development within areas of existing development or areas otherwise suitable for growth, as established by local jurisdictions. These measures include urban growth boundaries, urban service areas, environmental corridors, slope & density restrictions, stream conservation areas, and riparian buffers. This strategy would support regional resilience by limiting new growth in unincorporated areas in the wildland-urban interface and other high-risk areas.
Changes Since Draft Blueprint	None.

Environment: Expand Access to Parks and Open Space

Strategy EN5:
Protect and Manage High-Value Conservation Lands

Strategy Cost	$15 billion
Strategy Objective	To enhance regional resilience and quality of life through the conservation and management of priority agricultural and open space lands that support local food systems, biodiversity and natural resources, fire or flood protection, recreation opportunities, water supply, carbon sequestration and other ecosystem services.
Strategy Description	Provide strategic matching funds to help conserve and manage high-priority natural and agricultural lands, including but not limited to Priority Conservation Areas, wildland-urban interface lands, and other areas at high risk of wildfires, floods, or other natural hazards. Conserving the region's biodiversity and agricultural abundance requires planning and investment to support natural and working land protection, acquisition, and management. Management actions would prioritize protection of public health and safety, enhancement of environmental and recreational benefits, and sequestration of carbon to promote community and watershed resilience. This strategy would support regional goals for agriculture, open space, and public access, which include a vision of 2.2 million acres of preserved open space, enhanced wildfire, flood, and drought resilience, and a thriving agricultural economy. Bayland conservation, restoration and adaptation is included within the *Adapt to Sea Level Rise* strategy.
Changes Since Draft Blueprint	This strategy's title was updated to prioritize land management with an emphasis on fire resilience, with additional costs integrated as well.

Environment: Expand Access to Parks and Open Space

Strategy EN6:
Modernize and Expand Parks, Trails and Recreation Facilities

Strategy Cost	$30 billion
Strategy Objective	To support the ability of all Bay Area residents to easily access a variety of parks, trails, and recreation opportunities.
Strategy Description	Strategically plan and invest in quality parks, trails, and open spaces that provide inclusive recreation opportunities for people from all backgrounds, abilities, and ages to enjoy. Recognizing how the COVID-19 pandemic has highlighted the importance of easy access to parks and open space, as well as the disparities within the Bay Area, this strategy would fund enhancements to regional and local parks, development and maintenance of parks and recreation facilities, acquisition of new open space, and construction of cross-jurisdictional trails and greenways with an emphasis on expanding recreation opportunities in Equity Priority Communities and other underserved areas.
Changes Since Draft Blueprint	This strategy was not included in the Draft Blueprint and was added based upon public feedback this summer. This strategy would work to advance equity by focusing on improvements that address park-related disparities in the Bay Area. Such investments are resilient to wide range of potential futures for the Bay Area.

Environment: Reduce Climate Emissions

Strategy EN7:
Expand Commute Trip Reduction Programs at Major Employers

Strategy Cost	*not applicable*
Strategy Objective	Reduce greenhouse gas emissions and traffic congestion by partnering with major employers to shift auto commuters to telecommuting, transit, walking, and bicycling.
Strategy Description	Set a sustainable commute target for all major employers as part of an expanded Bay Area Commuter Benefits Program. Employers would then be responsible for expanding their commute trip reduction programs, identifying and funding sufficient incentives and/or disincentives to achieve or exceed the target. By the year 2035, no more than 40 percent of each employer's workforce would be eligible to commute by auto on an average workday. To minimize impacts on small businesses, businesses with fewer than 50 employees would be exempt from this policy; furthermore, recognizing the difficulty in serving rural jobs by transit and non-motorized modes, agricultural employers would also be exempt from this policy.

While each employer would have the flexibility to choose the right set of incentives and disincentives for their employees to meet or exceed the target, examples of employer-funded incentives include free or subsidized transit passes, bike & e-bike subsidies and giveaways, free bikeshare memberships, free commuter shuttles for employees, provision of on-site employee housing on current parking lots or other available land, rent or mortgage subsidies for employees residing in walkable transit-rich communities, and direct cash subsidies for walking, biking, or telecommuting. Employer-managed disincentives could include reduction or elimination of parking lots or garages, higher on-site or off-site parking fees, compressed work schedules, and elimination of dedicated workspaces in lieu of shared space.

This strategy works in conjunction with other complementary strategies in Plan Bay Area 2050, including the strategies in which Plan Bay Area 2050 assumes substantial funding that will, prior to 2035, make sustainable trips and this strategy much more attainable. |
| **Changes Since Draft Blueprint** | This strategy was not included in the Draft Blueprint and was added based upon public feedback this summer and fall. |

Environment: Reduce Climate Emissions

Strategy EN8:
Expand Clean Vehicle Initiatives

Strategy Cost	$4 $5 billion
Strategy Objective	To mitigate transportation-related greenhouse gas emissions by supporting the adoption of clean vehicles and expansion of charging/fueling infrastructure.
Strategy Description	Expand investments in programs that support the adoption and use of clean vehicles, which include more fuel-efficient vehicles and electric vehicles (EVs), through purchase incentives and deployment of charging and fueling infrastructure, in partnership with the Air District and the State. These investments would expand existing strategies in MTC's Climate Initiatives Program, which include investing in a Vehicle Buyback & Electric Vehicle Incentive Program initiative, and a Regional Electric Vehicle Charger Network initiative, and a Clean Vehicle Feebate Program, as well as new requirements for the electrification of Transportation Network Company (TNC) and autonomous vehicles (AVs). The Vehicle Buyback & Electric Vehicle Incentive Program would be expanded to subsidize at least 350630,000 new electric vehicles, with a priority for income-qualifying buyers. The Regional EV Charger program initiative subsidizes over 50,000 public EV chargers to expand charging opportunities for plug-in hybrid electric vehicles (PHEVs). The Clean Vehicle Feebate Program would establish fees on a higher emission vehicle purchases to provide rebates for cleaner vehicles.
Changes Since Draft Blueprint	Funding for this strategy was expanded eightfold, with additional equity elements integrated to make this strategy beneficial for a broader array of Bay Area residents.

Environment: Reduce Climate Emissions

Strategy EN9:
Expand Transportation Demand Management Initiatives

Strategy Cost	$1 billion

Generates parking revenues that can help fund Transportation Element *(amount to be determined during Final Blueprint analysis)* |
Strategy Objective	To mitigate transportation-related greenhouse gas emissions by reducing the demand for single-occupancy passenger vehicle trips and increasing access to shared ride, micromobility, and other transportation options.
Strategy Description	Expand investments in transportation demand management (TDM) programs through MTC's Climate Initiatives Program to reduce greenhouse gas emissions for other transportation sectors. This includes a wide range of programs that discourage single-occupancy vehicle (SOV) trips and support use of other travel modes. The Bay Area Commuter Benefits Program requires large employers to offer their employees benefits that encourage non-solo driving to work. Vanpool programs help organize and subsidize shared commute trips that reduce the number of vehicles on the road. Some local jurisdictions establish trip caps, which limit the number of vehicle trips to and from specific employment areas. Bike share services enable users to take short-distance trips to destinations or transit by bike instead of by car. Targeted transportation alternatives programs are community-based outreach programs are a set of engagement and behavioral economic approaches to provide residents and workers personalized information on transportation alternatives to driving alone and trigger sustained behavior change that reduces the amount of vehicle driving across the region. Car share services offer an alternative to personal vehicle ownership; carshare users drive fewer miles than vehicle owners and have access to vehicles that are more fuel efficient than average vehicles. A regional parking fee program pricing initiative helps manage driving demand by increasing the cost of parking at more destinations.
Changes Since Draft Blueprint	Parking element to this strategy was added for the Final Blueprint phase.

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TO: MTC & ABAG Executive Board
FROM: Ruth Bernstein, EMC Research, Inc.
RE: Voter research on potential November 2020 regional measure(s)
DATE: January 28, 2020

EMC Research has been working with both FASTER and the Bay Area Housing for All coalition as they investigate Bay Area opinions regarding potential voter approved revenue to address our region's housing and transportation challenges. The following are high level takeaways from multiple focus groups and thousands of quantitative responses from surveys conducted during the past year. All of the research was conducted among likely November 2020 voters in the nine county Bay Area.

Conclusion

Bay Area leaders have a unique opportunity with the upcoming November election to bring voters a proposal to invest in the overall quality-of-life, economic vitality, and environmental future of the region. Transportation and housing are ongoing and day-to-day frustrations for many, many Bay Area residents, with a feeling that there is no solution in sight. Residents are frustrated about sitting in traffic, angry that our transit system doesn't address their needs, extremely concerned about their own and others' ability to find a safe, affordable place to live, and worried about how our infrastructure is impacting climate change. They want real solutions that are regional and forward-thinking, and most are open to taxing themselves to pay for it.

Our research indicates that **securing support for a revenue measure** to address these challenges from two-thirds of voters in the region **will not be easy. It is, however, possible**.

Key Findings:

- Multiple polls over the past year have shown potential viability for a regional measure that addresses housing affordability, or transportation improvements, or both.

- There is tax hesitancy. Two taxes on the same ballot or two tax mechanisms in the same measure results in much lower support.

- Research has consistently shown very high support for general transportation and housing elements.

- The November 2020 election offers a unique opportunity, with an expected historically high turnout of voters who are supportive of a potential measure and may not vote in 2022.

- A well-organized broad-based coalition will be necessary.

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Multiple polls over the past year have shown potential viability for a regional measure that addresses housing affordability, or transportation improvements, or both.

<u>Housing</u>: Our research has included more than one test of a regional housing bond. Each time, voters were given a potential 75-word ballot question that included measure outcomes, benefits, a total bond amount of $10B and a cost of 35 cents per $1,000 of assessed value. In each test, support was **within the margin of error of the two-thirds threshold** (67% and 63%).

<u>Transportation</u>: As with housing, our research has included multiple uninformed ballot measure tests. While wording has changed somewhat in each poll, when given a ballot question that includes projects and outcomes funded by a one-cent sales tax, support is **consistently within the margin of error of two-thirds** (67% and 65%)

<u>Transportation & Housing</u>: Our most recent poll, just conducted this month, asked voters about the possibility of addressing **both regional challenges with one measure**. As shown below, support is within the margin of error of two-thirds, and after voters hear a simple positive statement, the Yes solidifies at 67%:

To reduce traffic congestion, address housing affordability, and make the Bay Area's transportation system more reliable, affordable, accessible, efficient and faster by: building a rail/transit network connecting the region; modernizing BART, trains, ferries, and buses for speed, safety, frequency; and creating affordable housing to shorten commutes; shall the measure enacting a one-cent sales tax, until ended by voters, generating at least $1,600,000,000 annually, with oversight and audits, and commuter benefits provided by large employers, be adopted?

> **65%** *Yes/Lean Yes*
>
> *31% No/Lean No*

Supporters of this measure say: Traffic congestion and housing prices in the Bay Area are at an all-time high. We need a true regional approach to address our future so that we can get where we need to go faster and easier, spend less time commuting, keep friends and family living in the Bay Area, and cut down on greenhouse gas emissions to address climate change.

> **67%** *Yes/Lean Yes*
>
> *30% No/Lean No*

There is tax hesitancy. Two taxes on the same ballot or two tax mechanisms in the same measure results in much lower support.

Our polling has included testing how voters might respond to both a housing bond and transportation sales tax measure on the same ballot, or how they may respond to a single measure that includes both a bond and a sales tax. None of these options come close to the two-thirds threshold. Support for a ballot question that included both a bond and a sales tax reached only 55%, even when it includes benefits, projects and programs to address housing and transportation.

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Research has consistently shown very high support for general transportation and housing elements.

- 88% support making the Bay Area's transportation system more reliable, affordable, accessible, efficient, and faster
- 88% support coordinating schedules and improving connections between Bay Area transit systems
- 85% support modernizing BART, trains, ferries and buses for speed, safety and frequency
- 83% support addressing housing affordability
- 82% support providing affordable housing for Bay Area residents including low-income families, veterans, seniors and persons with disabilities
- 78% support creating affordable housing to shorten commutes
- 74% agree that we need a regional approach to housing in the Bay Area, not simply city by city policies

The November 2020 election offers a unique opportunity, with an expected historically high turnout of voters who are supportive of a potential measure and may not vote in 2022.

The 2020 Presidential election is likely to generate historic voter turnout, probably higher than 2008 or 2016, and definitely higher than current expectations for 2022. All of the research clearly indicates significantly higher support for any type of measure among infrequent voters who are likely to show up this November, but may not vote again for a few years. Many of these voters are younger, renters, or people of color who are especially impacted by the high cost of housing and a transportation system that doesn't address their needs. Additionally, concern about these issues among voters overall is at an unprecedented high. They are frustrated and looking for solutions.

A well-organized broad-based coalition will be necessary.

Although voters clearly want change, there is hesitancy. Any measure will need a significant and well-organized privately funded campaign effort, a broad coalition of supporters, and the absence of organized funded opposition.

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Appendix 3: Unconstrained Transportation Project List

Projects included in the Plan Bay Area 2050 transportation project list as conceptual phases only:

- Construct a 6-lane arterial from Geneva Avenue/Bayshore Boulevard intersection to U.S. 101/Candlestick Point interchange
- Contra Costa AV Shuttle Program | Study
- Environmental Studies for SR-152 New Alignment
- Environmental Studies for 101/Candlestick Interchange
- Muni Metro T-Third Extension to South San Francisco | Planning & Environmental
- ACE Alviso Wetlands Doubletrack Study

Projects analyzed during Project Performance Assessment but ultimately not included in the Plan Bay Area 2050 transportation project list:

- BART Gap Closure (Millbrae to Silicon Valley)
- SMART to Richmond via New Richmond-San Rafael Bridge
- Altamont Corridor Vision Phase 1 (to San Joaquin Valley)
- BART Extension from Diridon to Gilroy (replacing existing Caltrain)
- BART on I-680 (Walnut Creek to West Dublin/Pleasanton)
- BART to Hercules & I-80 Bus from Vallejo to Oakland
- SMART to Solano (Novato to Suisun City)
- SMART Extension to Cloverdale
- Alameda County BRT Network + Connected Vehicle Corridors
- VTA LRT Systemwide Grade Separation
- VTA LRT Systemwide Full Automation
- Muni Metro Southwest M-Line Subway
- Oakland/Alameda Gondola Network
- Mountain View AV Network
- SR-85 Light Rail (Mountain View to US-101 Interchange)
- Cupertino-Mountain View-San Jose Elevated Maglev Rail Loop
- Bay Trail Completion
- Regional Bicycle Superhighway Network
- SR-12 Widening (I-80 to Rio Vista)
- San Francisco Arterial HOV and Freeway HOT Lanes
- Bus Rapid Transit on All Bridges: Dedicated Lanes + Service/Capacity Improvements
- I-680 Corridor Improvements (BRT, Express Bus, Shared AVs, Gondolas)
- Reversible Lanes on Top 10 Congested Bridges and Freeways

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