



INVESTMENT STRATEGY REPORT



Plan BayArea 2040

FINAL
SUPPLEMENTAL
REPORT



Metropolitan
Transportation
Commission



Association
of Bay Area
Governments

JULY 2017

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Plan Bay Area 2040:

Final Investment Strategy Report

July 2017



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Executive Summary

The transportation investment strategy is the set of projects and programs — and associated funding — that supports Plan Bay Area 2040’s projected land use pattern and helps the region achieve its performance targets. Like in original Plan Bay Area, adopted in 2013, the proposed Plan Bay Area 2040 investment strategy focuses heavily on operating, maintaining and modernizing the existing transportation network, and prioritizing transportation improvements connecting Priority Development Areas and job centers.

Transportation investment priorities for the Draft Plan reflect a continuing commitment to “Fix It First.” Approximately 90 percent of Plan Bay Area 2040’s investments focus on operating, maintaining and modernizing the existing transportation system. Plan Bay Area 2040 also directs almost two-thirds of future funding to investments in public transit, mostly to ensure that transit operators can sustain existing service levels through 2040.

Investment Strategy Summary for Plan Bay Area 2040

Investment Strategy	Project/Program Description	Amount
Operate and Maintain	Replace transit assets, operate and maintain local streets and state highways, and operate the transit system.	\$218 billion
Modernize	Improve the existing system without significantly increasing the geographical extent of the infrastructure. Major investments in this category include: electrifying Caltrain and completing portions of the express lane network.	\$50 billion
Expand	Extend fixed-guideway rail service or add lanes to roadways. Major investments in this category include: extending Caltrain to downtown San Francisco and BART into Silicon Valley, as well as implementing express lanes on U.S. 101 in San Mateo and Santa Clara counties.	\$31 billion
Debt Service and Cost Contingency	Ongoing debt service and financing costs, as well as a cost contingency for expansion projects.	\$5 billion
Total		\$303 billion

The projects and programs included in Plan Bay Area 2040 are listed individually and mapped, where applicable, in the [Online Project Database](#).

Introduction

Drawing on the priorities of the previous regional plan, Plan Bay Area 2040's investment priorities for the next 24 years are to operate and maintain the existing transportation system, modernize transit and roadways, and expand the system in strategic locations to accommodate growing job centers and Priority Development Areas. This supplemental report describes the methodology for creating the investment strategy, provides more detail on the broad investment categories described in the Plan document, and describes funding programs for implementing major transit priorities.

At its core, the investment strategy is a list of transportation priorities that could be implemented with funding identified in the Plan. These priorities include specific projects, such as the proposed Phase 2 BART extension to Silicon Valley, as well as multi-project transportation programs like Alameda County's Bicycle and Pedestrian Program. Most of the projects and programs in the list are included for all phases through construction, though some are included solely for planning or pre-construction phases. All Plan investments are fiscally constrained.¹

Considerations

The foundations for the investment strategy are assessments of the costs to operate and maintain existing services and costs to expand and modernize where needed. Caltrans, county congestion management agencies (CMAs), transit agencies and others submitted investment requests for expansion and modernization projects through a four-month Call for Projects that stretched from May to September 2015. At the same time, MTC evaluated how much revenue would likely be available for these purposes over the next 24 years. To determine which investments would be included in the Plan, MTC evaluated major projects and worked with transportation partners to prioritize all investments. This section describes the major steps of this process.

Table 1. Investment strategy process

Step	Process
1	Estimate costs to operate and maintain existing system
2	Evaluate funding requests for modernization and expansion projects
3	Forecast reasonably available revenues for transportation purposes
4	Evaluate projects against Plan targets and for cost-effectiveness
5	Prioritize investments within the revenue forecast

¹ Fiscal constraint means that all the costs in the regional transportation plan are covered by a forecast of future revenues that are reasonably expected to come to the region for transportation purposes.

One of the driving forces behind the development of the Plan Bay Area 2040 investment strategy is an ongoing partnership among regional transportation agencies to monitor regional transportation performance trends and then plan, fund, and deliver improvements to respond to system challenges. MTC, Caltrans District 4, cities, CMAs, and transit operators work collaboratively on these issues in fulfillment of the federally-required Congestion Management Process (CMP). MTC has been producing a Congested Conditions Report (2011-2014), based on INRIX data, that analyzes 144 unique segments. This work is now incorporated into the Vital Signs effort which tracks annual performance on a number of indicators. The transportation indicators tracked by MTC and its partners and included on the Vital Signs portal include:

- Commute Mode Choice
- Commute Time
- Commute Patterns
- Traffic Volumes at Gateways
- Time Spent in Congestion
- Miles Traveled in Congestion
- Travel Time Reliability
- Transit Ridership
- Transit system Efficiency
- Daily Miles Traveled
- Street Pavement Condition
- Highway Pavement Condition
- Bridge Condition
- Transit Asset Condition

See more at: <http://www.vitalsigns.mtc.ca.gov/>

Estimating Costs to Operate and Maintain Existing System

MTC worked with local jurisdictions, transit operators, and the California Department of Transportation (Caltrans) to develop cost estimates for operating and maintaining the Bay Area's transit system, local street and road network, the state highway system, and local and regional bridges.

Transit Operations and Maintenance

The costs of operating transit service and maintaining transit assets of the Bay Area's robust transit system is a key input to the investment strategy. To estimate the costs of future transit operations, MTC distributed a Transit Operating Needs Assessment Survey in the spring of 2015 to each of the Bay Area's 25 transit operators. The survey requested information on current and planned service levels, existing and projected operating costs, and existing and projected local operating revenues over the Plan period.

Transit operators extrapolated costs to operate the service they provided in 2015 for every year in the Plan period. This included 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 costs associated with planned service changes for committed capital projects and/or fully funded future increases in service hours over the Plan period.

On the transit capital side, MTC collected information on asset condition through the Regional Transit Capital Inventory (RTCI), which is a comprehensive regional database of the transit assets owned by Bay

Area transit agencies. The RTCI contains consistent and comparable data on the region’s transit capital assets and on replacement and rehabilitation costs for each transit operator. Transit operators provided all the information in the database, which contains information on transit asset types (vehicles, track, stations, systems, etc.), quantities, age, useful lives and replacement costs, among other details. Useful life is an estimate of the number of years an asset is likely to remain functional in terms of supporting transit service. MTC worked closely with transit operators to ensure the accuracy of the final assessments.

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. This includes eliminating the \$10 billion backlog of deferred replacement that existed in 2015 and prioritizing rehabilitation projects over the first 10 years of the planning period. In some cases, particularly for assets such as stations or tunnels, major components were assumed to be replaced or maintained on an annualized basis, rather than replaced entirely.

The cost to operate existing service through the next 24 years is approximately \$120 billion, of which 80% covers the four largest operators – SFMTA, BART, VTA, and AC Transit. To bring the assets of these four operators up to a state of good repair, the region would need to invest approximately \$37 billion, which is also almost 80% of the total transit capital need. Table 2 presents operations and maintenance needs for the largest transit operators. Figure 1 illustrates that for the same investment level of around \$50 billion, the region would fully fund existing operations of SFMTA and BART and bring both of the agency’s assets into a state of good repair.

Table 2: Operations and maintenance costs for transit

Transit Operator	Cost for Transit Operations (\$ Billions)*	Cost to Maintain Existing Asset Condition (\$ Billions)	Cost to Achieve Ideal Asset Condition (\$ Billions)
SFMTA	\$35	\$8	\$13
BART	\$31	\$12	\$18
VTA	\$16	\$2	\$3
AC Transit	\$13	\$1	\$3
Caltrain	\$5	\$2	\$4
SamTrans	\$5	\$1	\$1
GGHTD	\$4	\$1	\$1
Other Operators	\$10	\$2	\$4
Total	\$120	\$29	\$47

in year-of-expenditure dollars

***Note:** this is for existing service only. Increases in service are included in requests for modernization and expansion projects.

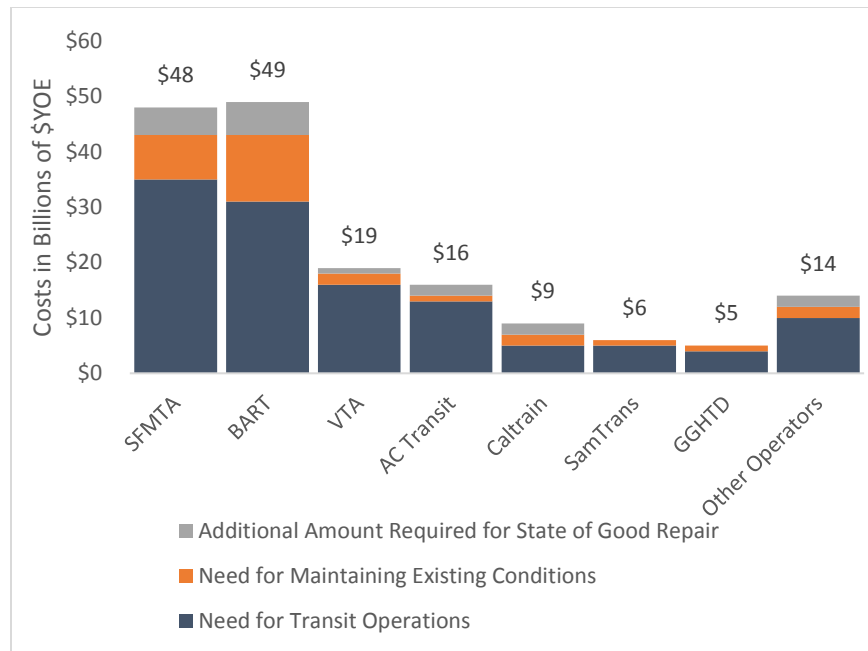


Figure 1: Transit operations and capital investment needs

Local Streets and Roads

The Bay Area's local street and road (LSR) network includes over 42,000 lane miles of roadways in communities, and covers an extensive inventory of non-pavement assets: miles of curbs and gutters, sidewalks, storm drains, traffic signs, signals and lights. The average condition of the Bay Area's LSR network in 2015, rated on a scale of 0 to 100, was 66. This pavement condition index (PCI) places the region's roadway network in the "fair" category, which means that on average, roads have significant levels of distress and may require a combination of rehabilitation and preventative maintenance to keep them from deteriorating rapidly.

Estimating the costs to maintain the region's LSR network relies on the biennial survey conducted as part of the [California Local Streets and Roads Needs Assessment](#). The survey conducted in 2014 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 to estimate funding levels required for different pavement conditions.

Preservation costs were calculated for two different condition level scenarios:

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

Streetsaver is an analysis tool that estimates the cost to maintain pavements at a specified condition level. Streetsaver databases for each jurisdiction include street inventory, conditions, and projected pavement lifecycle information. Pavement maintenance unit costs, a key input into the StreetSaver® model, were estimated by county, using information submitted by local jurisdictions to the 2014

California Local Street and Road Needs Assessment survey. The StreetSaver® model then estimates the long-term maintenance costs of each jurisdiction’s street network, assuming the most cost-effective maintenance strategies are applied.

Non-pavement capital maintenance includes assets such as storm drains, sidewalks, curbs and gutters, street lights, signs, and signals. To estimate non-pavement costs for the local road system, MTC used a prediction model developed by Nichols Consulting Engineers (NCE) that uses information provided by local jurisdictions on non-pavement asset inventory and useful life. For Plan Bay Area 2040, the non-pavement model was updated with asset inventory and replacement cost information provided by local jurisdictions in response to the 2014 California Local Street and Road Needs Assessment survey.

Table 3. Operations and maintenance costs for local streets and roads (LSR) by county

County	Cost to Maintain Existing Asset Condition (\$ Billions)	Cost to Achieve Ideal Asset Condition (\$ Billions)
Alameda	\$8	\$9
Contra Costa	\$6	\$6
Marin	\$1	\$2
Napa	\$1	\$1
San Francisco	\$7	\$8
San Mateo	\$4	\$4
Santa Clara	\$10	\$11
Solano	\$2	\$3
Sonoma	\$3	\$5
Total	\$43	\$49
in year-of-expenditure dollars		

State Highways and Bridges

The cost to maintain the region’s highways relies on information provided by Caltrans in its [2015 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 were 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.

Every two years, Caltrans produces a 10-year estimate of costs included in the SHOPP to preserve and maintain the state highway system and its supporting infrastructure. The 2015 SHOPP Plan contains a “Goal Constrained Needs Plan,” which is an estimate of costs to meet defined performance goals over a 10-year period for the following major categories: roadway preservation, bridge preservation, roadside preservation, minor mobility improvement, collision reduction, and major damage restoration. The costs to operate and maintain the highway system also include a growing need to maintain the hardware required for traffic management projects like ramp meters and dynamic signs. The 2015 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. Due to the different objectives, the “Financially Constrained” needs are lower than the “Goal Constrained” needs.

To estimate the costs for Plan Bay Area 2040, MTC used the Goal Constrained amounts for the first 10 years and the Financially Constrained amounts for the remaining years. 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 24-year total.

To increase accuracy beyond using a population share, staff substituted the estimated roadway preservation needs of the state highway system with an estimate generated by StreetSaver®. 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.

For the region’s locally-owned bridges, MTC used the Federal Highway Administration’s National Bridge Investment Analysis System (NBIAS) system to develop the projections of capital maintenance need. NBIAS has a modeling approach similar to that of the Pontis Bridge Management System (BMS), which is used by Caltrans for managing its bridges. Default costs, deterioration models and other parameters, 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.

MTC estimated the needs for the seven state-owned bridges differently than for the local bridges. There are seven state-owned toll bridges that span the San Francisco Bay including 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.

The Bay Area Toll Authority (BATA) maintains detailed 20-year cost projections and budget schedules in order to plan and deliver maintenance projects for the state-owned, toll bridges over the long-term. In addition to the projected future capital maintenance costs, BATA projects 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 Plan period.

Table 4. Preservation costs for state highways, local bridges, and regional bridges

Mode	Cost to Achieve Ideal Asset Condition (\$ Billions)
State Highways	\$20
Local Bridges	\$2
Regional Bridges	\$14

Total	\$36
in year-of-expenditure dollars	
Costs associated with maintaining existing condition levels is not available for the state highway system or bridges	

Combining operations and maintenance needs across modes, the region would need to spend \$230 billion to maintain existing asset condition and to operate existing transit service. To reach a state of good repair – meaning that roads are maintained at their optimum levels, transit assets are replaced at the end of their useful lives and existing service levels for public transit are maintained – the Bay Area will need to spend an estimated total of \$254 billion over the next 24 years.

Table 5. Costs to operate and maintain the existing transportation system.

Mode	Cost to Maintain Existing Asset Condition (\$ Billions)	Cost to Achieve Ideal Asset Condition (\$ Billions)
Local Streets and Roads	\$43	\$49
State Highways ¹	\$20	\$20
Local Bridges ¹	\$2	\$2
Regional Bridges ¹	\$16	\$16
Transit Capital	\$29	\$47
Transit Operating ²	\$120	\$120
Total	\$230	\$254
in year-of-expenditure dollars		
Notes: Costs associated with maintaining existing conditions are not available for highways and bridges, so the costs for ideal asset condition are listed in both categories. Transit operating costs are only for maintaining existing conditions.		

Full detail on forecasting maintenance and operations needs for the existing transportation system can be found in these supplemental reports: Local Streets and Roads, Bridges, and State Highway Needs Assessment and Transit Operating and Capital Needs and Revenue Assessment. These reports can be found here: <http://2040.planbayarea.org/reports>

Requests for Modernization and Expansion Projects

MTC also worked with partner agencies to determine funding needs for projects that would expand capacity and increase system efficiency beyond operating and maintaining the existing system. In the Call for Projects for Plan Bay Area 2040, transportation agencies requested almost \$200 billion for these types of projects. These requests reflect planning work conducted outside of the regional transportation plan process. Key supportive planning efforts are described in this section.

Countywide Transportation Plans and Modal Plans - congestion management agencies for each of the Bay Area's nine counties must develop a Congestion Management Program (CMP), which concludes with a seven-year Capital Improvement Program. Countywide transportation plans (CTPs) are long-term plans within which the CMP must fit. Although CTPs are voluntary, eight of the region's nine counties complete them regularly. These countywide plans constitute one of the primary foundations for the regional transportation plan, reflecting a bottoms-up approach for crafting Plan Bay Area 2040's transportation investment strategy. The countywide plans evaluate short-term and long-term pedestrian, bicycle, highway, transit, and trail needs in each county, and develop project recommendations for the regional transportation plan. CTPs also do not need to be constrained to a

specific revenue envelope, which means the project lists typically require further prioritization before incorporation in the regional transportation plan.

Transit Studies – Transit operators also conduct their own transportation plans that are used as input to the regional transportation plan. The [Core Capacity Transit Study](#) – evaluated transit needs within the San Francisco-Oakland Bay Bridge corridor, the most congested in the region. Two of the region’s largest transit operators – BART and SFMTA – also completed planning efforts resulting in agency priorities. This includes BART’s Sustainable Communities Operations Analysis (SCOA), which forms the basis for their BART Metro and Transbay Core Capacity projects, and SFMTA’s Transit Effectiveness Project (TEP), which forms the basis for their Muni Forward project.

Regional and Alameda County Goods Movement Plans – Given the contribution of goods movement to the regional economy and the renewed funding emphasis for goods movement, MTC and Alameda CTC completed goods movement plans in 2016. These plans evaluated goods movement needs, deficiencies, and opportunities for the Bay Area. The plans focused on the region’s largest single generator of freight activity – the Port of Oakland – as well as the region’s highway freight network, which increasingly supports dispersed and varied freight activity including deliveries, trips to and from distribution centers, and the movement of goods on their way to the Port. The recommendations from these plans emphasize sustainable economic vitality through increasing capacity at the Port while also mitigating the adverse community impacts from goods movement related to air quality, noise, and safety. Projects from these plans form the basis for the goods movement strategy of Plan Bay Area 2040.

Airport Plans – Airports are key pieces of any major metro area’s transportation network. Bay Area airports fuel our regional economy as job centers, cargo hubs and gateways for visitors. Regional agencies work with Bay Area airports and the Federal Aviation Administration (FAA) to plan for future airport improvements that benefit travelers, promote economic growth and protect the environment. MTC tracks airport activity as one of its indicators on Vital Signs and periodically evaluates long-term airport development decisions in Regional Aviation Activity Tracking Reports. While many airport development projects are not required to be included in the regional transportation plan, access improvements along nearby highway and transit facilities, as well as other infrastructure enhancements, ultimately are incorporated into the plan.

Revenue Forecast

Funds to implement all the transportation priorities in Plan Bay Area 2040 come from federal, state, regional, and local funding sources. Many funding sources and programs have specific purposes and eligibility restrictions, while various funding sources and programs provide flexibility. The following section details the fund sources and their respective funding programs of Plan Bay Area 2040’s revenue projections. The 24-year period covered by the revenue forecast begins in Fiscal Year (FY) 2016-17 and extends through FY 2039-40. Projected revenues in Plan Bay Area 2040 reflect fiscal constraint as required by federal regulation. 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.

Table 6. Funding sources by type and amount

Funding Source	Funding Type		Funding Amount (\$ Billions)
	Committed (\$ Billions)	Discretionary (\$ Billions)	
Federal	\$2	\$27	\$29
State	\$40	\$8	\$48
Regional	\$31	\$13	\$44
Local	\$156	\$12	\$168
Anticipated/Other		\$14	\$14
Total	\$229	\$74	\$303

The majority of transportation funding (\$229 billion) is committed to specific purposes or projects either by the nature of the revenue source or by voter-approved county sales tax measures and past regional bridge toll increases. Further, projects also could have prior funding commitments due to the ongoing timeline of the project. Funding for these committed projects and programs is included in the Plan in order to provide a complete picture of the regional investments and so that these critical efforts can continue to advance, often with additional future regional funding.

The remaining revenues are considered “discretionary,” meaning they can be flexibly applied to various transportation purposes within the constraints of the funding source. Discretionary funds are important not only because of their flexibility, but also because they reflect future revenues the region can leverage to influence policy and implementation. These future discretionary revenues total \$74 billion, approximately 24 percent of the total projected Plan Bay Area 2040 revenues, as shown in Table 7.

Table 7. Discretionary funding by fund source.

Fund Source	Discretionary Funding (\$ Billions)
Federal: FTA Programs for Transit Capital, STP/CMAQ, New Starts/Small Starts/Core Capacity, National Highway Freight Program	\$27
State: Cap and Trade, STA, High Speed Rail, STIP, ATP	\$8
Regional: Future regional gas tax and bridge toll increases, AB1107, and remaining revenue from existing bridge tolls ¹	\$13
Local: TDA	\$13
Anticipated/Unspecified ²	\$14
Total	\$74
in year-of-expenditure dollars	
Notes	
1. These revenues do not include future express lane toll revenues, which are considered committed revenues.	
2. Anticipated revenues reflect new state and federal revenues that are unknown at this time but likely to fund transportation projects in the region during the Plan period.	

The revenue envelope for Plan Bay Area 2040 is larger than the preceding regional transportation plan despite covering four fewer years. Key differences between this plan’s revenues and the previous plan, Plan Bay Area, are as follows:

- Local revenues have increased by 8% (or \$12 billion) since the original Plan Bay Area, thanks in part to local sales tax and bond measures that passed in November 2016 for BART and Santa Clara County.
- The amount of federal revenue is roughly the same, with significant differences in funding areas. Since the last plan, the Federal Transit Administration (FTA) has allowed transit agencies to compete for funding for capital replacements that enhance service through a new addition to the New Starts/Small Starts program called “Core Capacity.” The U.S. Department of Transportation has also re-packaged the existing highway program and included a larger focus on goods movement, via a new formula program and a discretionary program known as FASTLANE.
- The state’s Cap and Trade program is included, and reflects the implementation of MTC’s Cap and Trade framework (MTC Resolution No. 4130, Revised), which was adopted in 2013 and revised in 2016. In the last plan, Cap and Trade revenues were included in a reserve but not assigned to projects.

For more detail on the assumptions underlying the revenue forecast for Plan Bay Area 2040, see the Financial Assumptions Supplemental Report, which can be found here:

<http://2040.planbayarea.org/reports>

Performance: Scenario and Project Evaluation

After collecting project information and investment requests through the Call for Projects process, which draws on the many plans and studies described in the previous section, MTC evaluated the largest capacity-increasing projects individually as well as packages of projects against different land use scenarios. These two levels of evaluation are used to screen projects and determine what levels of investment would contribute to achieving the Plan’s targets, particularly in terms of reducing greenhouse gas emissions. These two assessments also inform the prioritization of investments within the revenue forecast.

In the scenario planning process, MTC and ABAG developed and evaluated three alternative land use and transportation scenarios illustrating the effects that different housing, land use and transportation strategies would have on adopted Plan Bay Area 2040 goals and performance targets. This evaluation informed the development of the region’s “preferred scenario,” which incorporated some of the most promising aspects of the three scenarios. For transportation, this includes an emphasis on increasing transit capacity to support the level of infill development projected in the Plan and reducing the amount of highway capacity expansion in order to meet the region’s greenhouse gas target (which is a state-mandated target).

In order to take a closer look at major transportation projects, MTC performed a project performance assessment, examining billions of dollars of potential transportation projects. This assessment included a measure of cost-effectiveness in the form of a benefit-cost ratio and a qualitative score for support of Plan Bay Area 2040 performance targets. Together, these two metrics identified high-, medium- and low- performing projects. The results of the assessment generally led to the following investment principles:

- Fund maintenance and rehabilitation of all infrastructure, which were among the highest performing investments
- Fund high-performing, major transit projects

- Fund highway mobility initiatives
- Fund transit efficiency and expansion projects in Priority Development Areas (PDAs)
- Complete funding plans for county priorities

For more information on project-level performance assessment, see the Performance Assessment Supplemental Report, which can be found here: <http://2040.planbayarea.org/reports>

For more detail on the inputs and assumptions underlying the scenarios evaluated for Plan Bay Area 2040, see the Scenario Planning Supplemental Report, which can be found here: <http://2040.planbayarea.org/reports>

With the results of the scenario and project evaluations, MTC worked with county congestion management agencies and transit operators to prioritize their original requests.

Transportation Investment Strategy

The investment strategy for Plan Bay Area 2040 reflects county and regional priorities, as well as funding assumptions for each project. As in the previous Plan Bay Area, almost 90% of the investments are related to operating, maintaining, and modernizing the transportation system. Simply operating and maintaining the existing system is the largest investment, which includes replacing transit assets, rehabilitating pavement for local streets and state highways, and operating the transit system. Modernization is the next highest priority, which includes projects that improve the existing system without significantly increasing the transportation footprint. Electrifying Caltrain and replacing BART's train control are two major investments within this category. Finally, projects that extend fixed-guideway or add lanes to roadways are included in the expand category. Major projects like extending Caltrain to downtown San Francisco and BART into Silicon Valley are in this category.

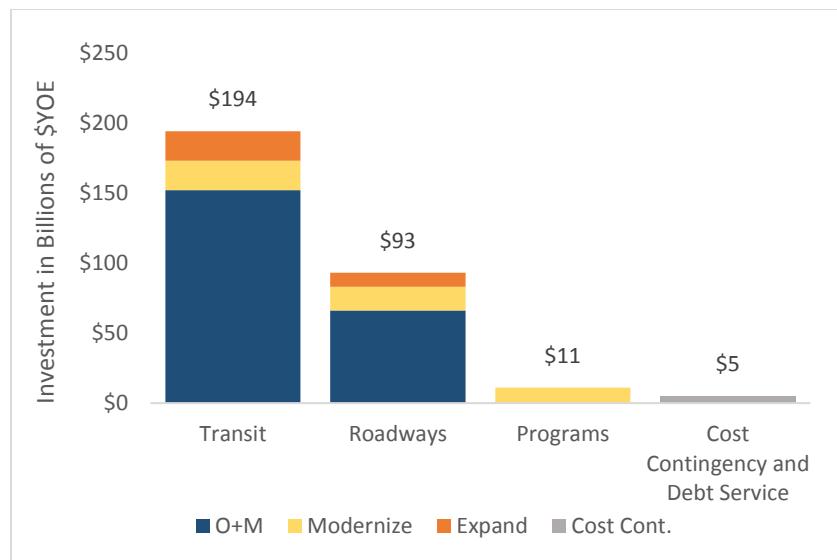


Figure 2. Plan Bay Area 2040 Funding Distribution

Note: Programs include investments related to the Climate program, access, general planning, and safety

The projects and programs included in Plan Bay Area 2040 are listed individually and mapped, where applicable, in the [Online Project Database](#).

Operate and Maintain

Plan Bay Area 2040 directs a majority of funding to maintain existing transportation assets and to support the infrastructure of the existing transportation system.

Transit Operations and Maintenance

Plan Bay Area 2040 fully funds the operation of existing transit services while also funding the majority of remaining high-priority transit capital needs. Almost 30 percent of discretionary funding is used to pay down the region's transit maintenance backlog. Consistent with the region's Transit Capital Priorities Policy, high-priority transit capital investments include replacing revenue vehicles (buses, railcars and ferries) – which are the Plan's top priority for transit capital funds – as well as maintaining "fixed guideway" infrastructure (track, bridges, tunnels and power systems) and communications equipment to ensure the safe, reliable and timely delivery of transit service throughout the region.

Transit operations are funded through \$104 billion in committed revenues and \$16 billion in future regional discretionary sources. Committed revenue consist of dedicated local funds that are controlled by the operators including transit fares, nonfare 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. Discretionary revenues consist of 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.

Funding for transit capital comes from dedicated federal funding for transit capital that are assumed to remain dedicated to this purpose. These fund sources include: FTA Urbanized Area Formula (Section 5307), Bus & Bus Facilities (Section 5339), and FTA State of Good Repair (Section 5337) and amount to nearly 65% of the funding to transit capital in the Bay Area. Besides these sources, several county sales tax measures support transit maintenance as well as already programmed One Bay Area Grant funds, and bridge toll revenues (e.g. AB 664). Committed funds amount to \$11 billion whereas regional discretionary funds amount to \$21 billion.

Despite a discretionary investment of nearly \$40 billion in transit operations and maintenance, a remaining maintenance need of almost \$15 billion remains, most of which is needed to replace non-vehicle assets for BART and Muni, including station repairs like replacing elevators and escalators.

Table 8. Funding distribution for transit operations and maintenance by operator.

Transit Operator	Amount for Transit Operations (\$ Billions)*	Amount for Transit Capital Maintenance (\$ Billions)	Remaining Need for Capital Maintenance (\$ Billions)
SFMTA	\$35	\$7	\$5
BART	\$31	\$13	\$5
VTA	\$16	\$3	<\$1
AC Transit	\$13	\$2	\$1
Caltrain	\$5	\$3	\$1
SamTrans	\$5	<\$1	\$1
GGHTD	\$4	<\$1	\$1
Other Operators	\$10	\$3	\$1
Total	\$120	\$32	\$15

***Note:** existing transit operations are fully funded in the Plan period

For more information on transit operations and maintenance costs, and more detail on the funding distribution by operator, see the Transit Operating and Capital Needs and Revenue Assessment supplemental report.

Local Streets and Roads

The next largest investment is for the operation and maintenance of the Bay Area's local streets and roads (LSR).

Revenues for LSR maintenance and operations are primarily from local and state sources. State taxes on gasoline, distributed by formula, provide a significant portion of these revenues. Local sources consist of countywide or city transportation sales taxes, general funds, and other fees. These sources are not enough to cover existing maintenance costs let alone to bring pavement to state of good repair. The Plan supplements these sources with a significant amount of discretionary revenue to LSR capital

maintenance. Discretionary revenue was assumed to be distributed for LSR to counties based on current funding distribution shares under the One Bay Area Grant program.

Between committed and future sources such as a potential regional gas tax, Plan Bay Area 2040 directs over \$35 billion for local streets and roads, which prioritizes operations expenses and costs to improve pavement conditions. This still leaves a gap of almost \$8 billion to maintain existing pavement as well as non-pavement assets like signals, storm drains and sidewalks, and a remaining need of \$14 billion to achieve a state of good repair for all local streets and roads assets. Consequently, the regional pavement condition index, a measure of the quality of pavement on a scale from 0 (failed) to 100 (brand-new), decreases from 66 in 2015 to 62 in 2040.

Table 9. Funding distribution for operating and maintaining local streets and roads.

County	Amount for LSR Operations and Maintenance (\$ Billions)*	Remaining Maintenance Need (\$ Billions)
Alameda	\$7	\$2
Contra Costa	\$4	\$2
Marin	\$1	\$1
Napa	\$1	<\$1
San Francisco	\$7	\$1
San Mateo	\$3	\$1
Santa Clara	\$9	\$2
Solano	\$1	\$2
Sonoma	\$2	\$3
Total	\$35	\$14

***Note:** LSR operations are fully funded in the Plan period.

For more information on maintenance costs and assumed funding distribution by county, see the Local Streets and Roads, Bridges, and State Highway Needs Assessment supplemental report.

Highways and Bridges

Funding for maintenance on state highways and bridges is included in Plan Bay Area 2040 mostly as committed funding since MTC does not influence where and how this money is spent. For the State highways, the plan directs 100% of future SHOPP revenues to State Highway Maintenance as well as acknowledge an “off the top” annual commitment for Presidio Parkway (Doyle Drive) in San Francisco.

Committed funding for the state-owned bridge maintenance consists of projected revenue from existing bridge tolls. Discretionary revenue is assumed to come from future (not yet enacted) tolls. Plan Bay Area 2040 assumes a two-dollar toll increase on all state-owned bridges, with \$1 added in 2019 and another \$1 added in 2024. Some of this future discretionary funding would be used for additional maintenance to the Bay Area’s bridges. Revenues available for investment in locally-owned bridges were projected based on the region’s historical share of state funding for bridge maintenance projects.

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 24-year PBA2040 period, less toll funds set aside for

transit operations. Total toll revenue for the Golden Gate Bridge capital maintenance needs over the 24-year PBA 2040 period is approximately \$2 billion.

For more information on maintenance costs and assumed funding distribution by county, see the Local Streets and Roads, Bridges and State Highway Needs Assessment supplemental report.

Debt Service, Financing, and Cost Contingency

Included in cost projections for operating and maintaining the Bay Area’s existing transportation system is a reserve for debt service, financing costs and future cost increases on modernization and expansion projects.

Modernize

The Bay Area’s transportation infrastructure, mostly built in the 20th century, will require significant upgrading to handle the travel volumes and travel needs of the 21st century. Modernization is critical to expand capacity on crowded BART lines, improve speeds on heavily used bus lines, add safe bicycle facilities on busy roads, install new technologies to smooth traffic flow, and redesign interchanges to handle greater traffic volumes.

Transit Modernization and Efficiency

In addition to investments in transit capital maintenance, Plan Bay Area 2040 will replace transit infrastructure through modernization projects that support either additional or more reliable service. Two examples of this type of project are Caltrain Electrification and BART Transbay Core Capacity projects. These projects replace aging vehicles and control systems with new equipment that increases capacity and enables more frequent and reliable operations.

Additional projects in this investment strategy include projects that increase transit capacity in the core of the region by modernizing or expanding existing services. Examples include: bus rapid transit along Geary Boulevard in San Francisco; ferry service increases from Vallejo, Oakland and Alameda to downtown San Francisco; and AC Transit service increases, particularly in the Transbay routes.

Table 10. Core capacity transit modernization investments.

Project Description by Corridor	Investment (billions \$)
Transbay Corridor Investments include BART service increases; WETA ferry service increases; new ferry terminals at Berkeley, Mission Bay and Alameda Point; AC Transit service increases and Bay Bridge operational projects.	\$5.5
Peninsula Corridor Investments include the Transbay Transit Center, electrifying Caltrain, and station improvements along the Peninsula	\$3.1
Within San Francisco Investments include Muni service increases, bus rapid transit on Van Ness Avenue and Geary Boulevard, Muni Forward and other operational improvements for SFMTA.	\$2.7

Project Description by Corridor	Investment (billions \$)
Planning for Future Capacity Improvements	
Placeholder for future planning and design work for additional capacity-increasing projects identified through the Core Capacity Transit Study and other planning work.	\$0.5
Core Connectivity in Santa Clara County	
Investments include increasing VTA core bus routes, El Camino Real BRT and a reserve for future transit improvements in the SR-85 corridor	\$1.8
<i>Note – Core capacity projects that would extend rail by adding more stations are included in the “expand” investment strategy and not included here. These include extending Caltrain to the Transbay Transit Center, Phase 2 of the BART extension to Silicon Valley, and extending VTA light rail to Vasona Junction and along Capitol Expressway.</i>	

This category also includes strategic investments in transit efficiency throughout the Bay Area, not just in the core. Projects in the North and East Bay yield significant benefits as a result of planned housing growth in PDAs and the growth of job centers. Investments in Santa Rosa CityBus would significantly increase service over today’s frequencies and implement priority bus corridors. San Pablo BRT, another cost-effective project in this category, would serve increasingly densifying corridors along San Pablo Avenue in the East Bay and provide a viable alternative to driving in one of the most congested highway corridors of the Bay Area.

Roadway Performance and Goods Movement

The Bay Area consistently ranks as one of the most congested metropolitan areas in the nation. This investment category invests in high-technology, large-impact operational strategies to improve performance of the region’s freeway and goods movement networks. The objectives of these strategies are highlighted in three programs: express lanes, goods movement, and roadway efficiency projects.

Express Lanes

Express Lanes are a high-tech way to take advantage of available capacity in under-used carpool lanes and to improve traffic management and reliability on heavily-used carpool lanes. Express lanes are carpool lanes that allow for toll-free travel by carpools, buses, motorcycles and qualifying clean-air vehicles while also giving solo drivers the choice to pay a toll for a more reliable trip. Express lanes can either be implemented through converting existing carpool lanes or constructing new lanes, that close gaps in the region’s carpool lane network. The express lane projects in the Modernize category include the conversions, which also comprise the region’s near-term express lane priorities and are typically less costly than the projects that require adding a new lane. Table 7 presents these segments.

Table 11. Modernization express lane projects.

County	Express Lane Segment – Conversions	Capital Project Cost (\$ Millions)*	Anticipated Open Year
Contra Costa	I-680 Express Lanes in both directions: Livorna/Rudgear to Alcosta	\$56	2017
Santa Clara	SR 237 Express Lanes: North First St. to Mathilda Ave.	\$27	2018
Alameda	I-880 Express Lanes in both directions: Hegenberger/Lewelling to SR-237	\$78	2019

County	Express Lane Segment – Conversions	Capital Project Cost (\$ Millions)*	Anticipated Open Year
Alameda	I-680 Southbound Express Lanes (SR-237 to SR-84) Upgrades	\$39	2019
Solano	I-80 Express Lanes in both directions: Airbase Parkway to Red Top Road	\$44	2020
Contra Costa	I-680 Express Lanes: Southbound from Marina Vista to Rudgear	\$36	2020
Alameda	SR-84 Express Lanes: Westbound from I-880 to Dumbarton Bridge Toll Plaza	\$6	2020
Alameda	SR-92 Express Lanes: Westbound from Hesperian to San Mateo Bridge Toll Plaza	\$7	2020
Contra Costa	I-680 Express Lanes: Northbound from Marina Vista to SR 242	\$15	2021
Alameda	I-80 Express Lanes: Westbound Bay Bridge Approaches	\$18	2022
Alameda & Contra Costa	I-80 Express Lanes in both directions: Carquinez Bridge to Bay Bridge	\$81	2022
Santa Clara	Various: I-880 Express Lanes: SR-237 to US-101 SR-87 Express Lanes: I-880 to SR-85 I-680 Express Lanes: SR-237 to US-101 I-280 Express Lanes: US-101 to Magdalena Avenue	\$275	2023-2029
Sorted by anticipated open year			
Costs listed are for capital expenses only			
Does not include I-680 carpool lane conversions through the SR-24 interchange in Contra Costa County because these depend on a carpool lane gap closure, which is part of a separate project.			

Goods Movement

Following on the recommendations of the region's goods movement plans, the investment strategy includes projects that would increase sustainable global competitiveness of the Port of Oakland and the Oakland Airport, increase smart operations and deliveries, and modernize infrastructure on high-priority freight corridors. These strategies could be realized through a first-time inclusion of dedicated state and federal funding for freight in the regional transportation plan. The revenue forecast assumes the region will receive \$2.3 billion of federal funding and \$0.5 billion of state Cap-and-Trade funding for goods movement. Combined with local and committed funding, Plan Bay Area 2040 directs over \$5 billion to goods movement projects and to programs that work to reduce adverse effects of freight travel through neighborhoods.

Table 12. Goods movement investments in Plan Bay Area 2040.

Goods Movement Investment	Investment (billions \$)
Global Competitiveness in Goods Movement	
Suite of projects such as 7th Street Grade Separation, Outer Harbor Intermodal Terminal and Oakland Army Base transportation components to improve operations and increase rail access at the Port of Oakland	\$1.2

Goods Movement Investment	Investment (billions \$)
Smart Deliveries and Operations	
Future program for deploying communications infrastructure to increase active traffic management along freight corridors and to/from the Port of Oakland	\$0.3
Modernizing Infrastructure	
Highway projects and interchange improvements along freight corridors such as I-880, I-80, I-580, I-680, U.S. 101 and S.R. 4.	\$3.2
Sustainable Goods Movement	
Future program for implementing recommendations of the Freight Emission Reduction Action Plan and developing programs for impact reduction in neighborhoods with high levels of freight activity.	\$0.4
Other Freight and Rail	
Programs and projects for minor freight-movement improvements and rail operations on track operated by public operators.	\$0.3

Roadway Efficiency Improvements

One of the most cost-effective methods for improving roadway performance is to use technology to actively manage traffic demand. When applied region-wide, initiatives like adaptive ramp meters and traffic signal upgrades yield benefits approximately 11 times greater than annual costs. Bay Area Forward² combines these types of investments with additional operational improvements, connected vehicle and shared-use mobility pilots and express bus investments. This suite of strategies is designed to improve the speed, reliability and person-throughput of roadways and transit services alike, and to prepare the Bay Area for further technological advancements in transportation. Among the near-term initiatives is *Bay Bridge Forward*, which will implement projects targeted at filling empty seats across the Bay Bridge corridor by encouraging carpooling and providing high-capacity transit.

These capacity improvements and technology investments rely on physical hardware and communications infrastructure that periodically must be replaced and upgraded. Transportation Management System projects aim to actively manage and enhance communications network systems, and to maintain and improve vital operational infrastructure used to monitor travel conditions and facilitate response to freeway incidents. Between projects in this category and investments in state highway operations and maintenance, Plan Bay Area 2040 directs significant funding to the development and maintenance of regional ITS architecture.

² When first evaluated for inclusion in Plan Bay Area 2040, this project was evaluated as the Columbus Day Initiative. The cost-effective technology upgrades in Columbus Day Initiative are now included in a more comprehensive, regional program known as Bay Area Forward.

Table 13. Roadway efficiency improvements in Plan Bay Area 2040.

Program Elements	Description
Freeway Efficiency Improvements	Upgrades all existing ramp meters to adaptive, which dynamically manages on-ramp traffic. Adaptive meters have been shown to increase corridor throughput over traditional ramp metering. Installs hard shoulder running lane, contra-flow lane, queue warning, and modifies ramps
Arterial Operations	Improves arterial operations through implementation of traditional time-of-day signal timing coordination, adaptive traffic signal control systems, transit signal priority, real-time traffic monitoring devices, ped/bike detection, queue-jump lanes, etc.
Connected and Automated Vehicle Program	Implements pilot deployments of vehicle-to-infrastructure (V2I) strategies, strategic planning for system readiness, training for local agencies, public/private partnerships, and comments on state and national policy developments.
Shared Mobility Pilot	Develops a pilot program to support transit agencies and/or private transit providers in deploying transit solutions.
Express Buses and Commuter Parking	Provides pilot express bus service for routes not currently served by operators and expands park-and-ride facilities throughout the region.
Intelligent Transportation Systems Infrastructure	Replaces and rehabilitates the physical ramp meters, induction loops and cameras used to manage traffic real-time and to collect traffic data for planning purposes. Maintains and replaces telecommunication networks connecting all field devices with potential to transition from copper lines to fiber optics
Incident Management	Enhances first responders' capabilities to clear traffic incidents and respond to major emergencies through integrated corridor management

Supporting Focused Growth and Reducing Greenhouse Gas Emissions

In addition to significant transit and roadway performance investments to encourage focused growth, Plan Bay Area 2040 directs funding to neighborhood active transportation and complete streets projects; climate initiatives to reduce greenhouse gas emissions; safety programs; PDA planning; and lifeline transportation and access initiatives for elderly, disabled and lower-income residents. These programs directly support major Plan Bay Area 2040 goals by assisting Priority Development Areas and Communities of Concern, emphasizing connections to high-quality transit, and reducing greenhouse gas emissions. Many of these programs are implemented through MTC's One Bay Area Grant (OBAG) program.

Reducing Greenhouse Gas Emissions

Transportation investments and development patterns in Plan Bay Area 2040 will not be sufficient on their own to reach the greenhouse gas (GHG) emissions reduction targets mandated for the Bay Area by state law. Approximately 8 percentage points of Plan Bay Area 2040's emissions reduction target for 2035 will be achieved through strategies that are part of MTC's Climate Initiatives Program. These include transportation demand management programs, alternative fuel/vehicle strategies and car sharing. Additionally, Plan Bay Area 2040 includes regional carpool incentives such as ride-matching applications along Express Lane corridors and county-sponsored climate programs that also will promote demand-management strategies and emission-reduction technology. Plan Bay Area 2040 directs \$526 million to the regional Climate Initiatives Program, \$56 million for incentivizing higher levels of carpooling and \$212 million for county-sponsored initiatives.

The types of projects and programs that would be funded through implementation of this category include:

- 1 Transportation demand management (TDM) strategies, car sharing, vanpool incentives, alternative fuel/vehicle initiatives, targeted transportation alternatives, trip caps and existing commuter benefits ordinances.
- 2 Regional carpool incentives such as private sector ride-matching applications that target use of express lane corridors as well as first/last mile solutions to transit.
- 3 County-sponsored climate programs such as additional TDM strategies and promotion of emission-reduction technology.

Active Transportation

Neighborhood-scale projects and many of the region's bicycle and pedestrian infrastructure needs are first evaluated and prioritized at the county level. These include both on-street facilities and recreational trails like the California Coastal Trail, the Great California Delta Trail, the Iron Horse Trail, and the Bay Trail. Plan Bay Area 2040 includes programmatic categories for funding these needs in programs such as Multimodal Streetscapes and Bicycle and Pedestrian programs for each county, amounting to over \$5 billion in funding for complete streets and active transportation projects over the next 24 years. Within these programs, counties have the flexibility to implement specific projects. Plan Bay Area 2040 also directs approximately \$200 million to completing the Bay Trail and \$10 million to continue planning for a bike path on the West Span of the San Francisco-Oakland Bay Bridge.

One key funding program for implementing active transportation projects is California's Active Transportation Program (ATP). In 2013, California created the Active Transportation Program (ATP), which combines various fund sources into a single cohesive program for bicycle and pedestrian projects. The Bay Area to date has adopted three cycles of ATP funding. In each cycle, the region has requested far more money than has been available. In the latest cycle, adopted in early 2017, Bay Area cities and counties submitted more than \$165 million in project requests for ATP funds — or 7.5 times the \$22 million available.

The following table lists the region's ATP projects for FY 2019-2020 and FY 2020-2021, totaling \$54 million. These projects constitute the region's near-term active transportation priorities, and focus on improving bicycle and pedestrian facilities in Communities of Concern, funding the region's Safe Routes to School Program, Bay Trail and Regional Bike Network build-out, and multi-jurisdictional projects.

Table 14. Bay Area's ATP projects for FY 2019-2020 and FY 2020-2021.

Location	Title	Cost (\$million)
Oakland	14th Street: Safe Routes in the City	\$11
Alameda	Central Avenue Complete Street Project	\$7
Oakland	Fruitvale Alive Gap Closure Project	\$6
Sunnyvale	Sunnyvale SNAIL Neighborhood Active Transportation Connectivity Improvements	\$5
San Rafael	Francisco Blvd East Avenue Bridge Bike Ped Connectivity	\$4
San Francisco	Powell Street Safety Project	\$4
Vallejo	Bay Trail/Vine Trail Gap Closure	\$4
Region-wide	Various projects including Safe Routes to School improvements, sidewalk gap closures, and trail completions	\$13

Location	Title	Cost (\$million)
<i>Note – only lists projects that are at least \$4 million, rounded to the nearest million</i>		

Access Initiatives

Plan Bay Area 2040 directs \$800 million to the Lifeline Transportation Program, which will fund priority projects identified by residents in MTC’s Communities of Concern. The Lifeline Program implements locally crafted Community-Based Transportation Plans, which MTC also funds, and can include community shuttles, transit services, and transit station/bus stop amenities. Additionally, Plan Bay Area 2040 directs \$90 million for a future mobility management program. Through partnerships with transportation service providers, mobility management enables communities to monitor transportation needs and to link individuals to appropriate, cost-efficient travel options. This strategy is key to the region’s ability to address the growth in its populations of seniors and people with disabilities.

County programs will contribute \$300 million to similar initiatives such as an affordable-fare program in San Francisco, a low-income school bus program in Contra Costa County, and expanding late-night transportation operations for workers traveling from San Francisco. Counties will invest another \$700 million in expanding paratransit services that directly benefit people with disabilities, many of whom also are seniors.

Investments for Special Generators: Airports and Military Bases

Airports

MTC tracks airport activity as one of its indicators on Vital Signs and periodically evaluates long-term airport development decisions in Regional Aviation Activity Tracking Reports. While many airport development projects are not required to be included in the regional transportation plan, access improvements along nearby highway and transit facilities, as well as other infrastructure enhancements, ultimately are incorporated into the plan.

The San Francisco Bay Area has invested significant amounts of funding over the past two decades to improve access to the region’s airports – first with the extension of BART to San Francisco International Airport and the nearby Millbrae Caltrain station in 2003, and then again in 2014 with the construction of the Oakland Airport Connector to provide a congestion-free ride between Coliseum BART and Oakland International Airport. Plan Bay Area 2040 includes funding to study access improvements to the region’s third-busiest airport – Mineta San Jose International. The study would analyze a proposed Automated People Mover connecting the airport to nearby Caltrain and light rail lines. Such a project would also connect to BART to Silicon Valley (Phase 2), a funded project in Plan Bay Area 2040. Going beyond access improvements, the Plan also includes perimeter dikes at Oakland International Airport to protect runways from flooding and future adverse impacts of sea level rise. After completion, the perimeter dike will be able to withstand severe storms and seismic events.

Military Bases

The region’s primary military base is the Travis Air Force Base (AFB) in Solano County. At roughly 15,000 employees, it is the largest single employer in Solano County. It is situated near State Route 12 and Interstate 80 in the city of Fairfield. Besides generating travel demand as an employment base, it also generates Department of Defense shipments that use the adjacent highway infrastructure. According to a Caltrans SR-12 Corridor System Management Plan, SR-12 is used daily for high priority shipments from the Defense Logistics Agency Distribution Center in Tracy to Travis AFB.

Many of the projects in Solano County will improve roadway access to and from the Air Force base. The largest improvement is reconstructing the interchange of I-80, I-680, and SR-12, along with auxiliary lanes that will reduce bottlenecks at the interchange. Additionally, the Plan invests in planning and design studies along SR-12 to determine appropriate transportation solutions for one of the primary corridors used by the air force base.

Expand

The remaining 10 percent of funding is directed toward a set of transit extensions and roadway expansions. Examples include the BART extension to San Jose and Santa Clara, and the Caltrain Downtown San Francisco Extension, which will provide new rail links to the hearts of the Bay Area's two largest cities. These projects are top regional priorities for federal [New Starts](#) funding over the next five years. This category also includes VTA's next set of light rail extensions planned for the Capitol Expressway and Vasona lines, and for SMART extensions to Larkspur and Windsor. The largest transit expansion project in this category is the Bay Area segment of California High-Speed Rail, with a price tag of over \$8 billion for the Bay Area, with funding largely provided by the High Speed Rail Authority.

Also in this category are select roadway expansions along highways and arterials throughout the region. The largest of these is the addition of new managed lanes (HOV and/or HOT) along U.S. 101 from Brisbane to Morgan Hill in the South Bay. Compared to the express lane segments that convert an existing carpool lane that are classified as modernization projects, the projects requiring a new lane are typically more expensive and would be implemented on a medium-term schedule (e.g. after 2020). Table 15 lists the expansion highway projects in Plan Bay Area 2040.

Table 15. Major highway expansion projects.

County	Project	Capital Project Cost (\$ Millions)	Anticipated Open Year
Contra Costa	I-680 Northbound HOV lane extension between N. Main and SR-242	\$54	2020
Solano	I-80 Express Lanes in both directions: Airbase Parkway to I-505	\$136	2020
San Mateo	U.S. 101 Managed Lane: I-380 to Whipple Ave.	\$365	2020
Contra Costa	I-680 Express Lanes: Northbound from Rudgear to SR 242	\$57	2021
Alameda	I-680 Express Lanes: Northbound from SR-84 to SR-237	\$394	2023
San Mateo	U.S. 101 Managed Lane: I-380 to San Francisco County line	\$222	2024
Alameda	I-880 Express Lanes: Northbound from Hegenberger to Lewelling and bridge improvements	\$221	2025
Solano	I-680 Express Lanes: I-80 westbound to I-680 southbound and I-680 northbound to I-80 eastbound direct connectors	\$140	2025
Santa Clara	SR 85 Express Lanes: US 101 (South San Jose) to Mountain View	\$198	2025
Marin + Sonoma	Implement Marin-Sonoma Narrows Phase 2	\$389	2025
Santa Clara	US 101 Express Lanes: Whipple Ave. in San Mateo County to Cochrane Road in Morgan Hill	\$507	2025

County	Project	Capital Project Cost (\$ Millions)	Anticipated Open Year
Contra Costa	I-680 Northbound Managed Lane Completion through 680/24	\$99	2026
Santa Clara	I-280 New HOV Lane from San Mateo County line to Magdalena Avenue	\$60	2029
Sorted by anticipated open year			
Costs include capital expenses only			

Regional Transit Funding Priorities

To implement the transit priorities of the investment strategy, the region periodically adopts priorities for particular funding sources. Transit projects totaling hundreds of millions or even billions of dollars generally require funding from multiple sources, including state and federal sources, and often rely on complex agreements among funding partners. Fierce competition for state and federal discretionary funds requires a unified set of regional priorities to successfully compete for these dollars.

The establishment of regional transit priorities started with the Regional Transit Expansion Program (Resolution 3434) in 2001. The resolution identified \$18 billion of transit expansion priorities for the following 25 years. As of 2017, most of these projects — including Phase 1 of the Transbay Transit Center, BART extensions to Warm Springs and Berryessa, the eBART extension in eastern Contra Costa County, BART/Oakland Airport Connector, Sonoma-Marin Rail Initial Operating Segment and SFMTA’s Central Subway — either are in service or under construction. The remaining large investments have been reconfirmed as priorities for future funding or are included in Plan Bay Area 2040 for early phases of work as development of the projects continues.

A large component of Resolution 3434 is the federal competitive program for transit expansion called New Starts and Small Starts, or Section 5309. Resolution 3434 created a regional strategy to secure funds from this highly competitive national funding source. The Bay Area in 2012 secured commitments for nearly \$2 billion in New Starts funding for San Francisco’s Central Subway and the extension of BART to Berryessa in East San Jose.

Since the last Plan Bay Area, FTA has enabled modernization projects that increase capacity, like vehicle replacements and train control upgrades, to compete with traditional expansion projects for the New and Small Starts Program. In response, regional and local partners in 2013 created the [Core Capacity Challenge Grant Program](#), which identified \$7.5 billion in funding for the region’s four largest operators — BART, Muni, AC Transit, and VTA — to finance vehicle replacement, fleet expansion and upgrades to key facilities.

Building on the successful progress of Resolution 3434, the results of the Performance Assessment, and the recently adopted Core Capacity Challenge Grant program, Plan Bay Area 2040’s regional transit priorities for Section 5309 funding include finishing important extensions of BART to San Jose and Caltrain to the new Transbay Transit Center in San Francisco, as well as the modernization of both systems. Other priorities include funding for bus rapid transit along Geary Boulevard in San Francisco and upgrading Market Street in San Francisco both for transit vehicles and for bicyclists and pedestrians.

Along with identifying these high-performing future transit investments, Plan Bay Area 2040 retains \$640 million in future New and Small Starts funding for projects to enhance transit service in the East

Bay and North Bay counties. All future priorities are subject to an assessment of feasible alternatives, an evaluation for cost-effectiveness and for performance against MTC's Transit-Oriented Development Policy.

Table 16. Priorities for New Starts/Small Starts/Core Capacity funding programs.

Project	Capital Cost	Committed	Funding Plan		
			New Starts/ Small Starts/ Core Capacity	Cap and Trade	Future Regional/ Other
BART to Silicon Valley – Phase 2	\$5,175	\$2,925	\$1,500	\$750	--
Transbay Transit Center, Phase 2 – Downtown Extension	\$3,999	\$1,167	\$1,000	--	\$1,832
Caltrain Electrification – Phase 1	\$2,211	\$1,431	\$647	\$20	\$113
BART Transbay Core Capacity Project	\$3,511	\$1,332	\$900	\$450	\$829
AC Transit – San Pablo BRT	\$300	\$25	\$75	--	\$200
VTA – El Camino Real BRT	\$267	\$192	\$75	--	--
SFMTA – Geary Boulevard BRT ¹	\$300	\$57	\$100	\$100	\$43
SFMTA – Better Market Street	\$415	\$215	\$65	\$110	\$25
Section 5309 Project Reserve ²	n/a	--	\$640	--	--

(values in millions of year-of-expenditure dollars)

Notes

1. \$174M in committed O&M and \$33M in committed vehicles is not listed.
2. Section 5309 funding reserve for North and East Bay projects. Of the Plan Bay Area (2013) amount, \$20 million has already been allocated to the SMART Larkspur extension.

Both the Core Capacity Challenge Grant and the region's New Starts priorities rely on steady commitments from future Cap-and-Trade funding from the state. The Cap-and-Trade program reduces pollution by imposing limits on emissions, which become more stringent each year. Major emitters must buy an allowance for every ton of carbon dioxide they release into the air and state law requires that this money be spent on projects that reduce greenhouse gas emissions.

Transit capacity projects play a large part in the [framework](#) MTC adopted for requesting Cap-and-Trade funding. Table 17 presents the full set of regional transit capital priorities for Cap-and-Trade program funding.

Table 17. Cap and Trade framework for transit capital projects.

Operator/Types of Projects	Amount (\$ Millions)
BART Transbay Core Capacity Project – fleet expansion, train control and Hayward Maintenance Facility	\$500
SFMTA – fleet expansion, facilities, core capacity/BRT projects	\$785

Operator/Types of Projects	Amount (\$ Millions)
AC Transit - fleet expansion, facilities, major corridors	\$340
VTA – BART to San Jose	\$750
Caltrain – Electrification and EMU expansion	\$225
Multiple Operators – expansion and modernization projects in high-ridership bus, ferry and light rail corridors	\$400

Projects on the Horizon

Although the investment strategy includes over \$300 billion in funding, this still is not enough to meet the region’s expansion and modernization needs. One way for project sponsors to continue working on projects that fall outside of the revenue envelope is to include only the comparatively low-cost early phases (e.g. conceptual planning, environmental impact analyses, right-of-way acquisition and preliminary design) of the project in the Plan. If these projects are to move forward, construction funding would need to be identified.

Table 18. Pre-construction projects in Plan Bay Area 2040.

Project Included through Planning, Environmental and/or Design Phases
Transit
BART to Livermore/ACE Project
SMART Extension from Windsor to Cloverdale
Southeast San Francisco Caltrain Station
Geneva Light Rail – San Francisco
Redwood City Ferry Terminal and Service
Redwood City Street Car
Mineta San Jose International Airport Automated People Mover Connector
Bay Bridge Contraflow Lane
Larkspur Ferry Terminal Parking Garage
Broadway Shuttle Expansion - Oakland
Highway
Improve local access at I-280/I-380 from Sneath Lane to San Bruno Avenue to I-380
U.S. 101/Candlestick Interchange
SR-239 Feasibility Studies
Westbound slow vehicle lane on State Route 92 from I-280 to State Route 35

Project Included through Planning, Environmental and/or Design Phases
Construct a six-lane arterial from Geneva Avenue/Bayshore Boulevard intersection to U.S. 101/Candlestick Point interchange
State Route 152 New Alignment
East and North Bay Express Lanes – Future Segments <ul style="list-style-type: none"> I-80 in Solano County from the Carquinez Bridge to Air Base Parkway and from I-505 to the Yolo County Line; I-680 in Solano County from the Benicia-Martinez Bridge to I-80; I-580 from Greenville Road to the San Joaquin County Line; I-680 in Alameda County from SR-84 to Alcosta
Santa Clara County Express Lanes – Future Segments <ul style="list-style-type: none"> US 101 from Morgan Hill to Santa Clara County line; I-880 from US 101 to I-280; SR-17 from I-280 to SR 85; SR-237 from Mathilda to SR 85
State Route 37 Improvements and Sea Level Rise Mitigation
U.S. 101/I-580 Interchange Direct Connector
U.S. 101 Tiburon East Blithedale Interchange
Sir Francis Drake Boulevard/Red Hill Avenue/Center Boulevard (known as "The Hub") – Marin County
Bike/Ped
San Francisco-Oakland Bay Bridge West Span Bicycle, Pedestrian and Maintenance Path