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Horizon/Plan Bay Area 2050:

Project Performance Findings

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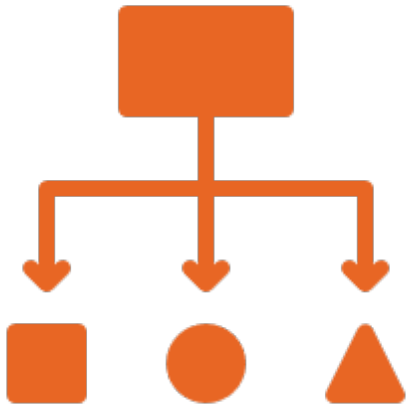
The Project Performance Assessment is **one key lens to understand how our major transportation investments would fare in an uncertain future**, in combination with Futures Planning which explored synergies between individual projects and strategies.

Key Objectives of Project Performance

- Understand how project benefits vary under different conditions.
- Learn how the performance of projects could be enhanced.
- Start a collaborative dialogue with all stakeholders.

Process to Date



Requested projects for consideration in Plan Bay Area 2050

Spring 2018 to Spring 2019

Develop evaluation methodology with input from RAWG/RMWG

Summer 2018 to Winter 2019

Evaluated benefits & costs of 93 projects using three Futures

Spring 2019 to Fall 2019

Identify findings/next steps to prioritize projects & strategies

Fall 2019 & beyond

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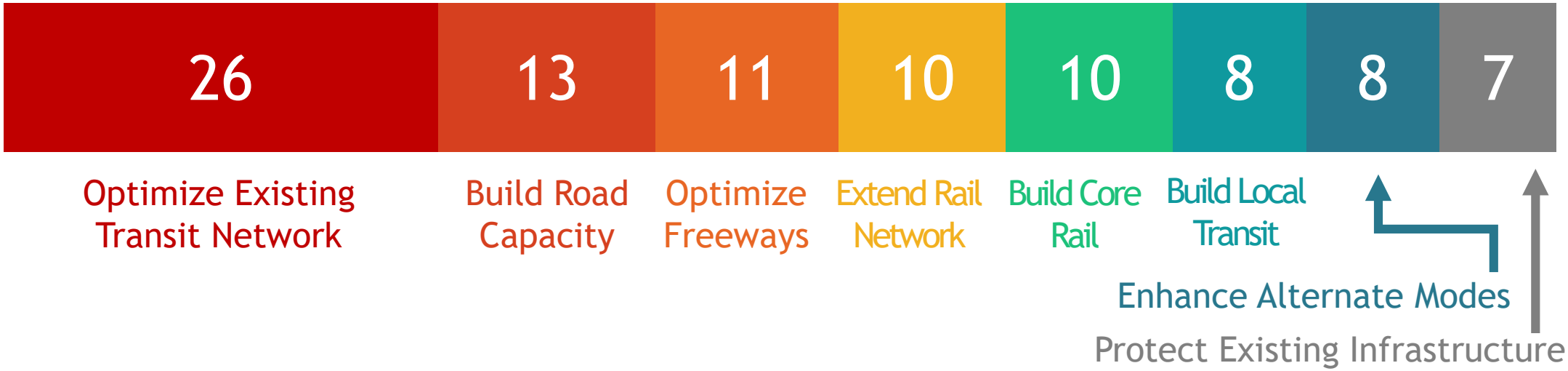
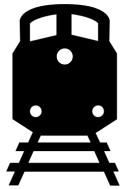
Which Projects Did We Evaluate?

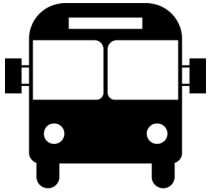
Number of Projects by Objective (Total: 94)



Capital Cost Breakdown of Projects



78% of capital costs are for rail investments



9% of capital costs are for bus investments

9% of capital costs are for road investments

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Which Projects Did We Not Evaluate?

Committed Projects
(not exhaustive list; included in baseline network for analysis)

- **BART:** Silicon Valley Phase 1; Fleet Modernization
- **Caltrain:** Modernization
- **Muni:** Central Subway; Muni Forward; Van Ness BRT; Geary BRT Phase 1
- **SMART:** Larkspur and Windsor Extensions
- **VTA:** Eastridge Extension; Next Network
- **AC Transit:** International Blvd BRT; AC Go
- **Express Lanes:** Committed Segments Only
- **Interchanges:** I-680/SR-4 (initial phases); I-80/I-680/SR-12 (initial phases)

Projects Less than $250 Million or Not Capacity-Increasing
(exempt from Project Performance)

How Were Projects Evaluated?

Benefit-Cost Assessment *(x 3 Futures)*: **is the project cost-effective & resilient?**

If benefit-cost ratio in a given Future is greater than 1, then benefits exceed costs.

- List of benefits and costs provided on following slide

Equity Assessment *(x 3 Futures)*: **is the project advancing equity?**

If greater than 60% of project access benefits benefit lower-income households, then it advances equity.

- Quantitative assessment: reflected in equity score
- Geographic assessment: showcased as secondary legacy assessment *(similar to Plan Bay Area 2040)*

Guiding Principles Assessment: is the project aligned with Plan Bay Area 2050's vision?

If no Guiding Principles "flags" are identified, then it is generally aligned with the Guiding Principles.

- Qualitative assessment based on the five Guiding Principles:
  - Affordable, Connected, Diverse, Healthy, Vibrant

How Were Projects Evaluated: *Benefit-Cost*

Benefits

Accessibility Benefits

- Travel time - in vehicle
- Travel time - out of vehicle
- Vehicle operating costs
- Travel costs
- Mode choice availability

- **Freeway Reliability + Vehicle Ownership**
- Transit Crowding
- **Environmental** (Emissions; Natural Land Loss)
- **Health** (Physical Activity; Air Pollutants; Noise)
- **Safety** (Collisions/Injuries; on-model & off-model/ operational benefits)

Major Enhancements from Plan Bay Area 2040

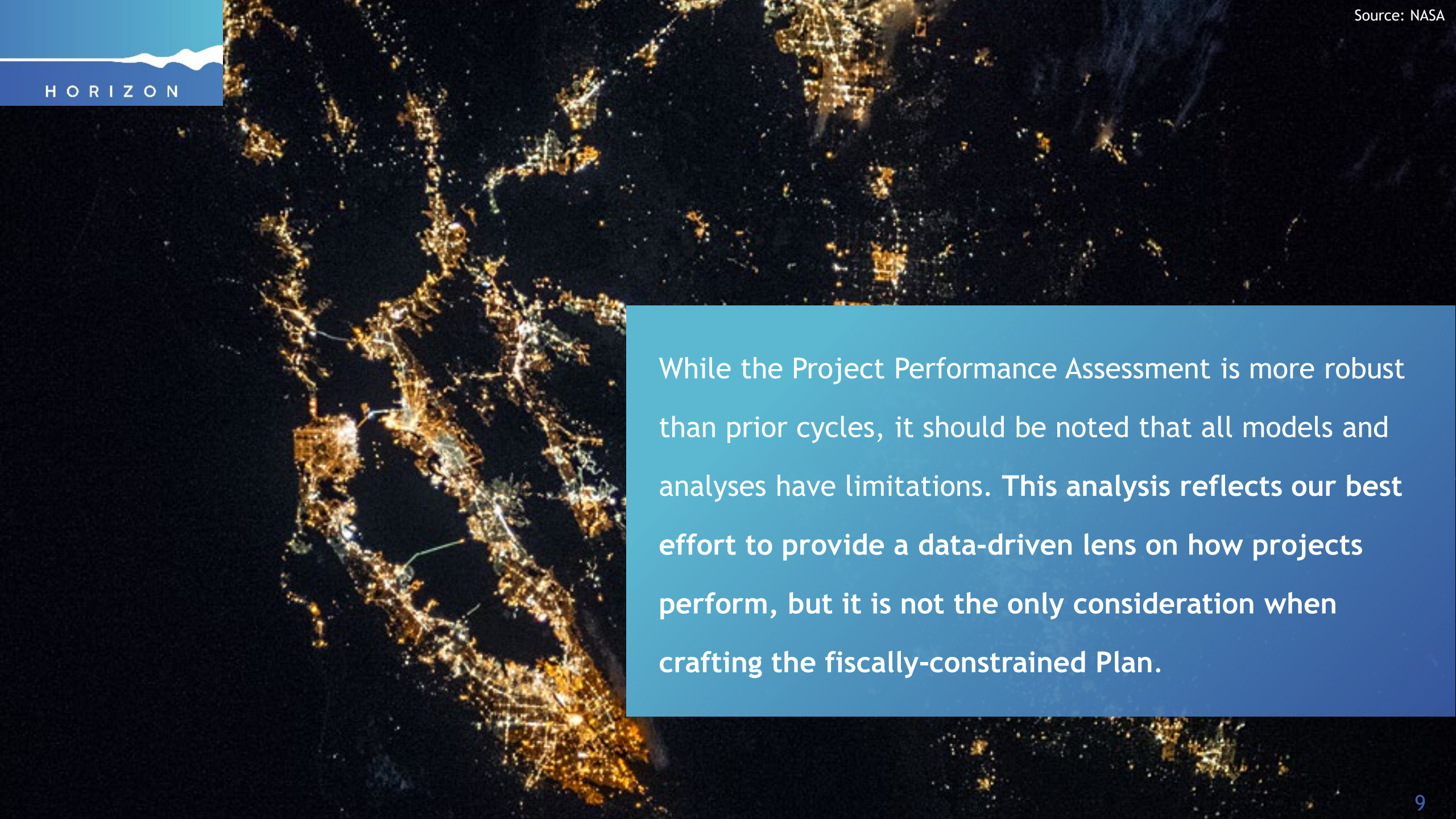
Costs

Capital Costs

- Initial investment
- Rehab/Replacement Costs
- Residual value

Operating & Maintenance Costs (annual)

$$\text{Benefit-Cost Ratio} = \frac{\text{Benefits}}{\text{Costs}}$$



Source: NASA

While the Project Performance Assessment is more robust than prior cycles, it should be noted that all models and analyses have limitations. **This analysis reflects our best effort to provide a data-driven lens on how projects perform, but it is not the only consideration when crafting the fiscally-constrained Plan.**

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Key Findings & Next Steps

Integrating Performance Findings into
Plan Bay Area 2050's Transportation Element

KEY FINDING

1

Costs of projects evaluated totaled more than $400 billion, well exceeding the fiscal constraints of the Bay Area.

Not only have existing megaprojects grown in costs, but bold new ideas are increasingly expensive. Plan Bay Area 2050 should recommend regional reforms to speed project delivery and manage capital and O&M costs.

KEY FINDING

2

Project performance will be significantly affected by uncertain future conditions.

Projects should be planned along with complementary strategies that enhance their performance and resilience, such as enhanced land use strategies near new stations or pricing strategies to boost demand.

KEY FINDING

3

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

Such projects should be seen as low-hanging fruit and advanced to implementation expeditiously.

KEY FINDING

4

High-cost commuter rail projects have mixed performance outcomes, predominantly benefiting higher-income groups.

Rail projects should be evaluated alongside lower-cost bus improvements. Rail projects should be paired with complementary fare policy and land use strategies to ensure that all Bay Area residents benefit from them.

KEY FINDING

5

Some projects have synergies, while other projects compete with each other.

In a fiscally-constrained environment, we should focus on complementary investments and strategies, while being careful before including projects that degrade benefits of others.

KEY FINDING

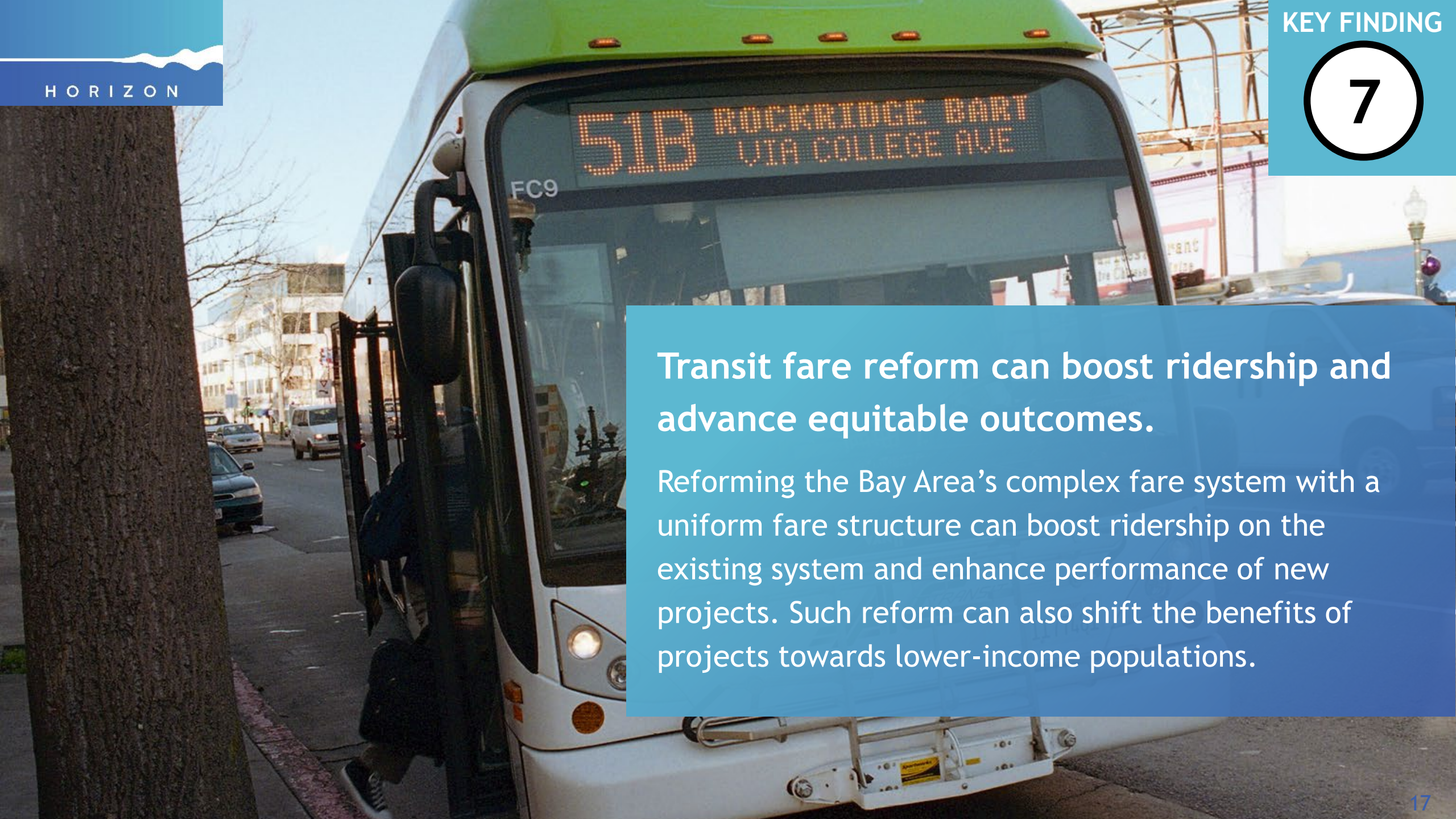
6

Pricing is the most effective tool to manage auto congestion on freeways - but it must be done in an equitable manner.

When meaningful transit alternatives are available, rather than adding highway capacity, Plan Bay Area 2050 should integrate pricing strategies with means-based tolls that are reinvested back in those corridors.

KEY FINDING

7



Transit fare reform can boost ridership and advance equitable outcomes.

Reforming the Bay Area's complex fare system with a uniform fare structure can boost ridership on the existing system and enhance performance of new projects. Such reform can also shift the benefits of projects towards lower-income populations.

KEY FINDING

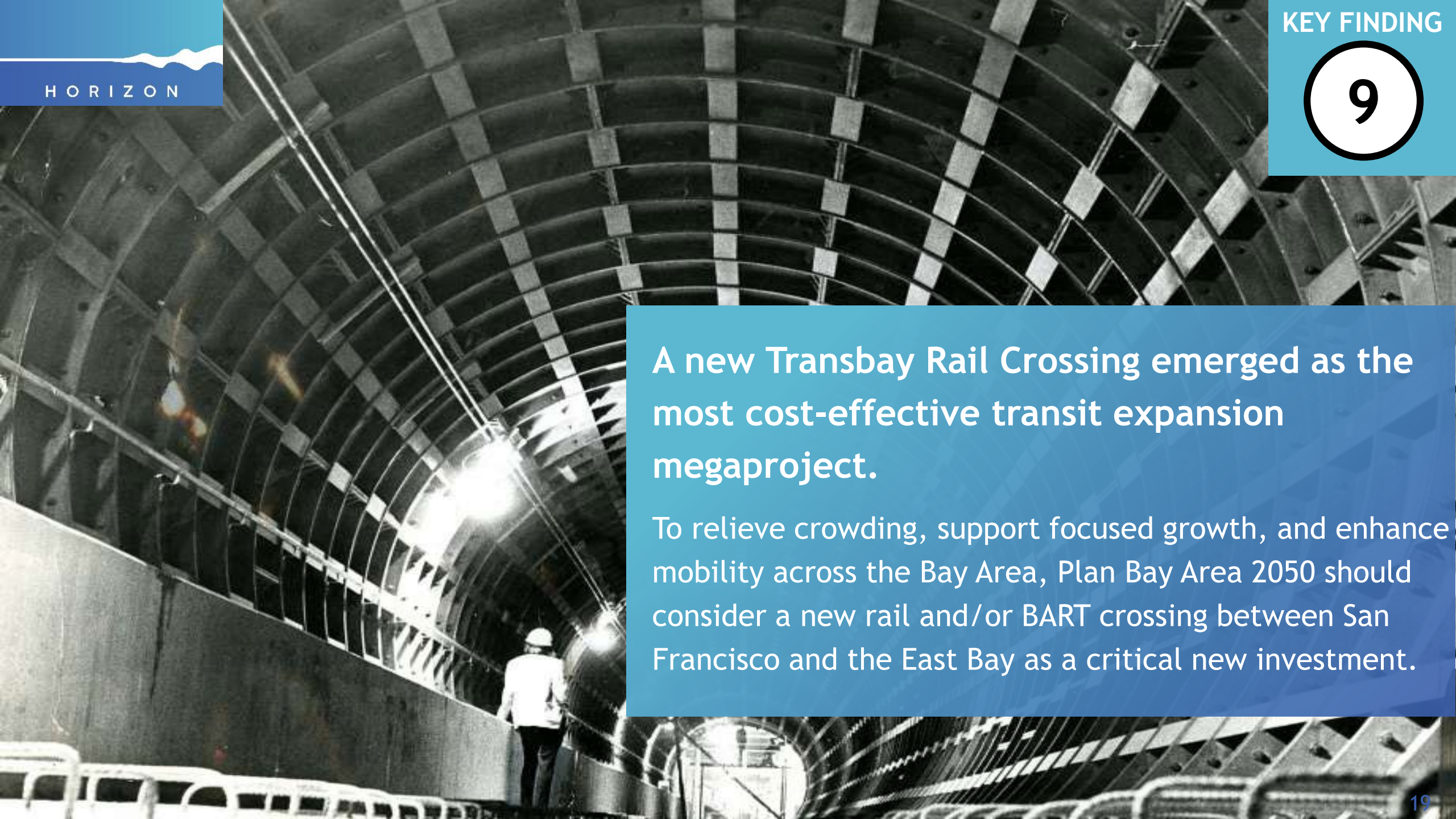
8

Greater investment in micromobility can have significant regional benefits for the overall transportation network.

The region should consider including a much more significant investment in active transportation than prior iterations of Plan Bay Area.

KEY FINDING

9



A new Transbay Rail Crossing emerged as the most cost-effective transit expansion megaproject.

To relieve crowding, support focused growth, and enhance mobility across the Bay Area, Plan Bay Area 2050 should consider a new rail and/or BART crossing between San Francisco and the East Bay as a critical new investment.

Findings on Select Corridors

- **Peninsula/US-101.** The region should carefully consider the sequencing of investments on this corridor, especially given a potential nexus with a New Transbay Rail Crossing.
- **Altamont Pass.** Rather than adding auto capacity, combining Valley Link with complementary pricing strategies presents a promising path forward.
- **South Bay.** Some of the aspirational transit improvements in Santa Clara County fell short on cost-effectiveness in most Futures, but there may be land use benefits of such projects that cannot be fully reflected.
- **SR-4/SR-239.** Operational improvements yield meaningful benefits to travelers along this freeway corridor, but expansions are less resilient in an uncertain future.
- **SR-37.** For this east-west connection, the proposed resilience project had higher costs and lower benefits than other transportation facilities requiring protection from rising sea levels.

Snippet from Attachment A: Summary Table of Projects

	Benefit-Cost Ratio			Equity Score		
Guiding Principle Flags	Rising Tides Falling Fortunes	Clean and Green	Back to the Future	Rising Tides Falling Fortunes	Clean and Green	Back to the Future
2	0.7	2	2	Even	Even	Even
2	0.6	1	1	Even	Even	Even
0	0.6	1	1	Even	Even	Even
0	0.6	1	1	Even	Even	Even
0	<0.5	0.7	0.6	Challenges	Challenges	Challenges
0	<0.5	<0.5	0.6	Advances	Advances	Even
2	<0.5	0.5	<0.5	Challenges	Challenges	Challenges
0	<0.5	<0.5	0.5	Even	Even	Challenges
2	<0.5	<0.5	<0.5	Challenges	Challenges	Challenges
0	<0.5	<0.5	<0.5	Advances	Advances	Even
0	<0.5	1	1	Even	Even	Even
0	<0.5	0.6	0.7	Challenges	Challenges	Challenges
0	<0.5	<0.5	<0.5	Even	Advances	Even
0	<0.5	<0.5	<0.5	Challenges	Challenges	Challenges
1	<0.5	<0.5	<0.5	Even	Advances	Even
0	<0.5	<0.5	<0.5	Even	Even	Even
0	<0.5	1	1	Challenges	Challenges	Challenges
0	<0.5	<0.5	<0.5	Even	Challenges	Challenges
0	<0.5	0.5	<0.5	Advances	Challenges	Challenges
0	<0.5	<0.5	<0.5	Challenges	Even	Challenges
0	1	2	2	Even	Even	Even
0	0.5	0.6	0.8	Advances	Advances	Even
2	<0.5	1	0.5	Challenges	Even	Challenges
2	<0.5	0.9	0.5	Challenges	Even	Challenges
0	<0.5	<0.5	0.6	Advances	Advances	Even
1	<0.5	<0.5	0.7	Advances	Advances	Even
0	<0.5	<0.5	<0.5	Advances	Advances	Challenges
0	<0.5	<0.5	0.5	Advances	Advances	Even
0	<0.5	<0.5	<0.5	Advances	Advances	Even
2	<0.5	<0.5	<0.5	Even	Even	Even
0	<0.5	<0.5	0.5	Even	Advances	Even

Findings from Transformative Project Submissions

Transit Fare Integration

- Transit Fare Integration was the second-most effective project in shifting commute mode share to transit in two Futures.
- The project resulted in overall growth in transit fare revenue in two futures.
- When paired with commuter rail projects, fare integration can change the equity score from “Challenges” to “Advances”.

Road Pricing

- Demand-Based Tolling of all freeway lanes was the most effective project in shifting commute mode share to transit in one Future.
- Both versions of all-lane tolling that were evaluated had the effect of considerably increasing average auto speeds on freeways.
- While tolling generally results in a “Challenges” equity score, means-based tolling in the case of Demand-Based Tolling enabled an “Even” equity score.

Express Buses

- While overall costs of the project evaluated outweighed benefits, high-frequency express buses on a connected express lane network can generate significant ridership in select corridors, while reducing overcrowding on existing rail lines.
- Benefits skew towards higher-income households in the absence of complementary fare strategies.

Moving Forward

- **During Plan Bay Area and Plan Bay Area 2040,** MTC has used the Project Performance Assessment to categorize projects as high-, medium- and low-performing - with low-performing projects required to submit a "compelling case" if they wished to include it in the fiscally-constrained Plan.
- **For Plan Bay Area 2050, we are proposing a solutions-oriented approach instead.** MTC will identify issues causing projects to underperform and will work collaboratively with sponsors to identify project refinements or complementary local or regional strategies to address performance shortcomings.

Moving Forward

January

- Focus on operational strategies and highest performing projects to include in the Draft Blueprint

February

- Work collaboratively with project sponsors to identify mitigation actions to address performance shortcomings

Spring 2020

- Incorporate projects along with refinements and mitigation actions into Final Blueprint

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Questions?

Thank you to our transportation partners from across the Bay Area for their continued collaboration - as we work together to make our major investments even better in the coming months.

Horizon/Plan Bay Area 2050: Final Project Performance Findings
Attachment A: Overall Summary Table
Benefit-Cost Ratios and Equity Scores across Three Futures, and Guiding Principle Flags

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

							Benefit-Cost Ratio			Equity Score		
Project Type	Project ID	Row ID	Project	Project Source	Lifecycle Cost	Guiding Principle Flags	Rising Tides Falling Fortunes	Clean and Green	Back to the Future	Rising Tides Falling Fortunes	Clean and Green	Back to the Future
Build Core Rail	1004	1	New San Francisco-Oakland Transbay Rail Crossing - Commuter Rail (Crossing 5)	Crossings Study	$46.1B	2	0.7	2	2	Even	Even	Even
	1007	2	New San Francisco-Oakland Transbay Rail Crossing - BART + Commuter Rail (Crossing 7)	Crossings Study	$83.5B	2	0.6	1	1	Even	Even	Even
	1002	3	New San Francisco-Oakland Transbay Rail Crossing - BART (Crossing 3: Mission St)	Crossings Study	$36.2B	0	0.6	1	1	Even	Even	Even
	1003	4	New San Francisco-Oakland Transbay Rail Crossing - BART (Crossing 4: New Markets)	Crossings Study	$37.4B	0	0.6	1	1	Even	Even	Even
	2300	5	Caltrain Downtown Extension	TJPA	$4.8B	0	<0.5	0.7	0.6	Challenges	Challenges	Challenges
	2205	6	BART to Silicon Valley (Phase 2)	VTA	$6.0B	0	<0.5	<0.5	0.6	Advances	Advances	Even
	2306	7	Dumbarton Rail (Redwood City to Union City)	SamTrans + CCAG	$3.9B	0	<0.5	<0.5	0.5	Even	Even	Challenges
	2310	8	Megaregional Rail Network + Resilience Project (Caltrain, ACE, Valley Link, Dumbarton, Cap Cor)	City of San Jose	$54.1B	2	<0.5	0.5	<0.5	Challenges	Challenges	Challenges
	2208	9	BART Gap Closure (Millbrae to Silicon Valley)	VTA	$40.4B	0	<0.5	<0.5	<0.5	Advances	Advances	Even
	6002	10	SMART to Richmond via New Richmond-San Rafael Bridge	Public/NGO Submission	$5.0B	2	<0.5	<0.5	<0.5	Challenges	Challenges	Challenges
Extend Rail Network - High Cost	2308	11	Valley Link (Dublin to San Joaquin Valley)	TVSJVRRA	$3.0B	0	<0.5	1	1	Even	Even	Even
	2309	12	Altamont Corridor Vision Phase 1 (to San Joaquin Valley)	TVSJVRRA, SJRRC	$4.6B	0	<0.5	0.6	0.7	Challenges	Challenges	Challenges
	2206	13	BART Extension from Diridon to Cupertino	VTA	$12.1B	0	<0.5	<0.5	<0.5	Even	Advances	Even
	2207	14	BART Extension from Diridon to Gilroy (replacing existing Caltrain)	VTA	$17.7B	1	<0.5	<0.5	<0.5	Even	Advances	Even
	2204	15	BART on I-680 (Walnut Creek to West Dublin/Pleasanton)	Caltrans	$11.0B	0	<0.5	<0.5	<0.5	Even	Even	Even
	2203	16	BART to Hercules & I-80 Bus from Vallejo to Oakland	CCTA	$5.8B	0	<0.5	<0.5	<0.5	Challenges	Challenges	Challenges
Extend Rail Network - Low Cost	2312	17	ACE Rail Service Increase (10 Daily Roundtrips)	SJRRC	$1.3B	0	<0.5	1	1	Challenges	Challenges	Challenges
	2202	18	BART DMU Extension to Brentwood	CCTA	$0.6B	0	<0.5	0.5	<0.5	Advances	Challenges	Challenges
	2305	19	SMART to Solano (Novato to Suisun City, without sea level rise protections)	SMART	$1.6B	0	<0.5	<0.5	<0.5	Even	Challenges	Challenges
	2304	20	SMART Extension to Cloverdale	SMART	$0.5B	0	<0.5	<0.5	<0.5	Challenges	Even	Challenges
Optimize Existing Transit Network - High Cost	2201	21	BART Core Capacity	BART	$4.5B	0	1	2	2	Even	Even	Even
	2001	22	AC Transit Local Rapid Network: Capital Improvements + Service Increase	AC Transit	$6.4B	0	0.5	0.6	0.8	Advances	Advances	Even
	2303	23	Caltrain Full Electrification and Blended System: High Growth	VTA, City of San Jose	$31.3B	2	<0.5	1	0.5	Challenges	Even	Challenges
	2302	24	Caltrain Full Electrification and Blended System: Moderate Growth	Caltrain + HSR	$24.6B	2	<0.5	0.9	0.5	Challenges	Even	Challenges
	2005	25	Alameda County BRT Network + Connected Vehicle Corridors	ACTC	$4.0B	0	<0.5	<0.5	0.6	Advances	Advances	Even
	2410	26	VTA LRT Systemwide Grade Separation and Full Automation	City of San Jose	$14.8B	1	<0.5	<0.5	0.7	Advances	Advances	Even
	2409	27	VTA LRT Systemwide Grade Separation	VTA	$11.6B	0	<0.5	<0.5	0.5	Advances	Advances	Even
	2401	28	North San Jose LRT Subway	VTA	$4.9B	0	<0.5	<0.5	0.5	Even	Advances	Even
	2411	29	VTA LRT Systemwide Grade Separation, Network Expansion, and Full Automation	VTA, City of San Jose	$44.2B	0	<0.5	<0.5	<0.5	Advances	Advances	Even
	2407	30	Muni Metro Southwest M-Line Subway	SFCTA	$5.6B	0	<0.5	<0.5	<0.5	Advances	Advances	Challenges
	2301	31	Caltrain Full Electrification and Blended System: Base Growth	Caltrain + HSR	$20.9B	2	<0.5	<0.5	<0.5	Even	Even	Even

Lifecycle Costs: This includes initial capital cost, annual O&M costs, rehabilitation and replacements costs, and a residual value of the investment at the end of the analysis period, calculated using discounted present value methodology. Refer to Attachment D for details, and for costs as reviewed with sponsors. Note: Societal transfers such as fare/toll revenue (or loss) are excluded from both benefits and costs, following standard practice for societal benefit-cost analyses.
Guiding Principle Flags: Flags, based on qualitative analysis, are intended to draw attention to a direct adverse impact a project may have that may not be captured as part of other assessments. Refer to Attachment C for details.
Benefit-Cost Ratio: All project impacts are measured against a uniform base transportation and land use network in each future, except Resilience projects, which are measured against a baseline where that asset is out of service (hence n/a in some futures). Costs and Benefits to determine the ratio are detailed in Attachment D and E. For inter-regional projects, modeled Bay Area benefits have been multiplied by a factor to reflect the ratio of expected ridership from outside the region. Valley Link/ACE Rail benefit multiplier: 3.3; Caltrain/HSR benefit multiplier: 1.3 (the HSR multiplier is applied in Clean and Green only, the Future where HSR is completely built out).
Equity Score: "Advances" indicates that the project may benefit lower income individuals (below regional median income) more than higher income individuals. "Challenges" indicates that project benefits skew towards higher income individuals. "Even" indicates even distribution of benefits for all income groups.
Note on Bicycle Projects: Improvements to individual bicycle facilities cannot be sufficiently modeled using Travel Model 1.5 (except Bay Bridge West Span since this opens up a connection); Travel Model 2.0 (under development) may allow more advanced analysis in the future. As an interim solution, a single "Enhanced Regionwide Bike Infrastructure" (Project ID 6006) was modeled, supported by off-model assertions based on research literature review. This project does not consider any specific improvements, but instead provides perspective on the benefits of a regionwide bike infrastructure investment (e.g. shared streets, trails, superhighways) on our transportation system.
(Full methodology can be found here: https://mtc.ca.gov/sites/default/files/ProjectPerformance_Methodology.pdf)

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Optimize Existing Transit Network - Low Cost	3001	32	Treasure Island Congestion Pricing	SF	$0.8B	1	8	7	>10	Challenges	Challenges	Challenges
	6111	33	Integrated Transit Fare System (with Transit Capacity Expansion)	Public/NGO Submission	$0.3B	0	6	7	>10	Advances	Advances	Advances
	6112	34	Integrated Transit Fare System and Seamless Transfers (with Transit Capacity Expansion)	Public/NGO Submission	$0.5B	0	5	7	>10	Advances	Advances	Advances
	2209	35	Irvington BART Infill Station	ACTC	$0.2B	0	1	1	9	Even	Even	Even
	3002	36	Downtown San Francisco Congestion Pricing	SF	$0.3B	1	2	3	4	Challenges	Challenges	Challenges
	2007	37	San Francisco Southeast Waterfront Transit Improvements	SF	$0.6B	0	2	3	4	Even	Even	Even
	2100	38	San Pablo BRT	AC Transit	$0.5B	0	1	3	4	Advances	Advances	Even
	2008	39	Alameda Point Transit Network Improvements	ACTC	$0.5B	0	0.7	3	4	Even	Even	Even
	2000	40	AC Transit Local Network: Service Increase	AC Transit	$2.6B	0	1	2	2	Advances	Advances	Even
	2101	41	Geary BRT (Phase 2)	SF	$0.6B	0	1	2	3	Even	Even	Challenges
	2105	42	Alameda County E14th St/Mission and Fremont Blvd Multimodal Corridor	ACTC	$0.5B	0	1	2	2	Advances	Advances	Even
	2103	43	SamTrans El Camino Real BRT: Capital and Service Improvements	CCAG	$0.6B	0	1	1	2	Advances	Even	Challenges
	2003	44	Muni Forward: Capital Improvements + Service Increase	SF	$2.9B	0	0.7	2	1	Even	Even	Even
	6100	45	Integrated Transit Fare System	Public/NGO Submission	$0.3B	0	2	<0.5	5	Advances	Advances	Advances
	2004	46	Sonoma Countywide Bus: Service Increase	SCTA	$0.9B	0	<0.5	<0.5	1	Advances	Even	Even
	2400	47	Downtown San Jose LRT Subway	VTA	$1.9B	0	<0.5	<0.5	1	Even	Even	Even
	6106	48	Free Transit for Low-Income Households	Public/NGO Submission	$0.1B	0	<0.5	<0.5	<0.5	Advances	Advances	Advances
	6101	49	Free Transit for All	Public/NGO Submission	$0.1B	1	<0.5	<0.5	<0.5	Advances	Advances	Advances
Build Local Transit	4000	50	Oakland/Alameda Gondola Network	City of Oakland	$1.1B	1	0.7	<0.5	2	Even	Advances	Even
	4001	51	Mountain View AV Network (Free Fare, Subsidies from Companies)	City of Mountain View	$1.4B	1	<0.5	0.9	1	Advances	Advances	Advances
	2403	52	Vasona LRT Extension (Phase 2)	VTA	$0.3B	0	0.7	<0.5	1	Advances	Advances	Even
	2412	53	SR-85 LRT (Mountain View to US101 interchange)	City of Cupertino	$3.7B	0	<0.5	0.7	0.6	Even	Challenges	Even
	2408	54	Muni Metro T-Third Extension to South San Francisco	City of South San Fran..	$1.8B	0	<0.5	<0.5	1	Challenges	Challenges	Even
	4002	55	Contra Costa Autonomous Shuttle Program	CCTA	$3.4B	0	<0.5	<0.5	<0.5	Advances	Even	Challenges
	4003	56	Cupertino-Mountain View-San Jose Elevated Maglev Rail Loop	City of Cupertino	$8.1B	1	<0.5	<0.5	<0.5	Challenges	Challenges	Challenges
	2402	57	San Jose Airport People Mover	VTA	$1.4B	0	<0.5	<0.5	<0.5	Even	Challenges	Even
Enhance Alternate Modes	2600	58	WETA Ferry Service Frequency Increase	WETA	$0.4B	0	2	6	3	Challenges	Even	Even
	6006	59	Enhanced Regionwide Bike Infrastructure	MTC/ABAG	$12.6B	0	1	3	3	Advances	Advances	Advances
	2602	60	WETA Ferry Service: Berkeley - San Francisco	WETA	$0.2B	0	<0.5	1	1	Advances	Even	Even
	2700	61	Bay Bridge West Span Bike Path	MTC/ABAG	$0.8B	0	<0.5	1	0.5	Even	Challenges	Challenges
	2603	62	WETA Ferry Service: Redwood City - San Francisco - Oakland	WETA	$0.3B	0	0.6	0.6	<0.5	Even	Even	Even
	4004	63	Regional Hovercraft Network	CCAG	$2.6B	0	<0.5	0.6	<0.5	Even	Challenges	Advances
	6004	64	Bay Trail Completion	Public/NGO Submission	n/a	0	cannot be modeled			cannot be modeled		
	6005	65	Regional Bicycle Superhighway Network	Public/NGO Submission	n/a	0	cannot be modeled			cannot be modeled		

Lifecycle Costs: This includes initial capital cost, annual O&M costs, rehabilitation and replacements costs, and a residual value of the investment at the end of the analysis period, calculated using discounted present value methodology. Refer to Attachment D for details, and for costs as reviewed with sponsors. Note: Societal transfers such as fare/toll revenue (or loss) are excluded from both benefits and costs, following standard practice for societal benefit-cost analyses.
Guiding Principle Flags: Flags, based on qualitative analysis, are intended to draw attention to a direct adverse impact a project may have that may not be captured as part of other assessments. Refer to Attachment C for details.
Benefit-Cost Ratio: All project impacts are measured against a uniform base transportation and land use network in each future, except Resilience projects, which are measured against a baseline where that asset is out of service (hence n/a in some futures). Costs and Benefits to determine the ratio are detailed in Attachment D and E. For inter-regional projects, modeled Bay Area benefits have been multiplied by a factor to reflect the ratio of expected ridership from outside the region. Valley Link/ACE Rail benefit multiplier: 3.3; Caltrain/HSR benefit multiplier: 1.3 (the HSR multiplier is applied in Clean and Green only, the Future where HSR is completely built out).
Equity Score: "Advances" indicates that the project may benefit lower income individuals (below regional median income) more than higher income individuals. "Challenges" indicates that project benefits skew towards higher income individuals. "Even" indicates even distribution of benefits for all income groups.
Note on Bicycle Projects: Improvements to individual bicycle facilities cannot be sufficiently modeled using Travel Model 1.5 (except Bay Bridge West Span since this opens up a connection); Travel Model 2.0 (under development) may allow more advanced analysis in the future. As an interim solution, a single "Enhanced Regionwide Bike Infrastructure" (Project ID 6006) was modeled, supported by off-model assertions based on research literature review. This project does not consider any specific improvements, but instead provides perspective on the benefits of a regionwide bike infrastructure investment (e.g. shared streets, trails, superhighways) on our transportation system.
(Full methodology can be found here: https://mtc.ca.gov/sites/default/files/ProjectPerformance_Methodology.pdf)

Horizon/Plan Bay Area 2050: Final Project Performance Findings
Attachment A: Overall Summary Table
Benefit-Cost Ratios and Equity Scores across Three Futures, and Guiding Principle Flags

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

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

Lifecycle Costs: This includes initial capital cost, annual O&M costs, rehabilitation and replacements costs, and a residual value of the investment at the end of the analysis period, calculated using discounted present value methodology. Refer to Attachment D for details, and for costs as reviewed with sponsors. Note: Societal transfers such as fare/toll revenue (or loss) are excluded from both benefits and costs, following standard practice for societal benefit-cost analyses.
Guiding Principle Flags: Flags, based on qualitative analysis, are intended to draw attention to a direct adverse impact a project may have that may not be captured as part of other assessments. Refer to Attachment C for details.
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Equity Score: "Advances" indicates that the project may benefit lower income individuals (below regional median income) more than higher income individuals. "Challenges" indicates that project benefits skew towards higher income individuals. "Even" indicates even distribution of benefits for all income groups.
Note on Bicycle Projects: Improvements to individual bicycle facilities cannot be sufficiently modeled using Travel Model 1.5 (except Bay Bridge West Span since this opens up a connection); Travel Model 2.0 (under development) may allow more advanced analysis in the future. As an interim solution, a single "Enhanced Regionwide Bike Infrastructure" (Project ID 6006) was modeled, supported by off-model assertions based on research literature review. This project does not consider any specific improvements, but instead provides perspective on the benefits of a regionwide bike infrastructure investment (e.g. shared streets, trails, superhighways) on our transportation system.
(Full methodology can be found here: https://mtc.ca.gov/sites/default/files/ProjectPerformance_Methodology.pdf)

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

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

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

Equity Score

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

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

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

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

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

Project ID	Row ID	Project	Project Type	Lifecycle Cost	Guiding Principle Flags	Provides Point of Access in CoC?	Equity Score		
							Rising Tides Falling Fortunes	Clean and Green	Back to the Future
1004	34	New San Francisco-Oakland Transbay Rail Crossing - Commuter Rail (Crossing 5)	Build Core Rail	$46.1B	2	Yes	Even	Even	Even
2603	35	WETA Ferry Service: Redwood City - San Francisco - Oakland	Enhance Alternate Modes	$0.3B	0	No	Even	Even	Even
1007	36	New San Francisco-Oakland Transbay Rail Crossing - BART + Commuter Rail (Crossing 7)	Build Core Rail	$83.5B	2	Yes	Even	Even	Even
2308	37	Valley Link (Dublin to San Joaquin Valley)	Extend Rail Network - High Cost	$3.0B	0	Yes*	Even	Even	Even
2301	38	Caltrain Full Electrification and Blended System: Base Growth	Optimize Existing Transit Network - High Cost	$20.9B	2	Yes	Even	Even	Even
1001	39	Southern Crossing Bridge + New San Francisco-Oakland Transbay Rail Crossing - BART (Crossing 6)	Build Road Capacity - High Cost	$47.1B	1	Yes	Even	Even	Even
5003	40	I-680 Corridor Improvements (BRT, Express Bus, Shared AVs, Gondolas)	Optimize Existing Freeway Network	$4.6B	0	Yes	Even	Even	Even
2008	41	Alameda Point Transit Network Improvements	Optimize Existing Transit Network - Low Cost	$0.5B	0	Yes	Even	Even	Even
2201	42	BART Core Capacity	Optimize Existing Transit Network - High Cost	$4.5B	0	Yes	Even	Even	Even
2204	43	BART on I-680 (Walnut Creek to West Dublin/Pleasanton)	Extend Rail Network - High Cost	$11.0B	0	No	Even	Even	Even
3110	44	Union City-Fremont East-West Connector	Build Road Capacity - Low Cost	$0.4B	1	No	Even	Even	Even
6103	45	Demand-Based Tolling on All Highways with Means-Based Tolls	Optimize Existing Freeway Network	$6.0B	1	Yes	Even	Even	Even
2400	46	Downtown San Jose LRT Subway	Optimize Existing Transit Network - Low Cost	$1.9B	0	Yes	Even	Even	Even
7005	47	SR-237 Resilience Project (Alviso)	Resilience	$0.2B	0	No	Even	n/a	Even
4004	48	Regional Hovercraft Network	Enhance Alternate Modes	$2.6B	0	Yes	Even	Challenges	Advances
1006	49	San Mateo Bridge Reconstruction and Widening (Crossing 1)	Build Road Capacity - High Cost	$15.7B	1	Yes	Advances	Challenges	Even
4002	50	Contra Costa Autonomous Shuttle Program	Build Local Transit	$3.4B	0	Yes	Advances	Even	Challenges
3103	51	SR-4 Widening (Brentwood to Discovery Bay)	Build Road Capacity - Low Cost	$0.4B	1	Yes	Advances	Even	Challenges
2103	52	SamTrans El Camino Real BRT: Capital and Service Improvements	Optimize Existing Transit Network - Low Cost	$0.6B	0	Yes	Advances	Even	Challenges
6104	53	Reversible Lanes on Top 10 Congested Bridges and Freeways	Optimize Existing Freeway Network	$2.4B	1	Yes	Challenges	Even	Advances
2600	54	WETA Ferry Service Frequency Increase	Enhance Alternate Modes	$0.4B	0	Yes	Challenges	Even	Even
3104	55	I-80/I-680/SR-12 Interchange + Widening (Phases 2B-7)	Build Road Capacity - Low Cost	$0.7B	2	Yes	Challenges	Even	Even
2412	56	SR-85 LRT (Mountain View to US101 interchange)	Build Local Transit	$3.7B	0	No	Even	Challenges	Even
2402	57	San Jose Airport People Mover	Build Local Transit	$1.4B	0	Yes	Even	Challenges	Even
3101	58	I-680/SR-4 Interchange Improvements (Direct/HOV Connectors, Ramp Widening, Auxiliary Lanes)	Build Road Capacity - Low Cost	$0.4B	1	No	Even	Challenges	Even
3105	59	SR-12 Widening (I-80 to Rio Vista)	Build Road Capacity - Low Cost	$2.5B	2	Yes	Even	Challenges	Even
1005	60	Mid-Bay Bridge (I-238 to I-380) (Crossing 2)	Build Road Capacity - High Cost	$19.9B	2	Yes	Even	Challenges	Even
3106	61	SR-152 Realignment and Tolling	Build Road Capacity - Low Cost	$1.9B	2	No	Even	Challenges	Even
3109	62	SR-262 Widening and Interchange Improvements	Build Road Capacity - Low Cost	$1.2B	2	No	Even	Even	Challenges
2101	63	Geary BRT (Phase 2)	Optimize Existing Transit Network - Low Cost	$0.6B	0	Yes	Even	Even	Challenges
2306	64	Dumbarton Rail (Redwood City to Union City)	Build Core Rail	$3.9B	0	Yes	Even	Even	Challenges
2202	65	BART DMU Extension to Brentwood	Extend Rail Network - Low Cost	$0.6B	0	No	Advances	Challenges	Challenges
3100	66	SR-239 Widening (Brentwood to Tracy including Airport Connector)	Build Road Capacity - Low Cost	$2.4B	1	No	Challenges	Advances	Challenges

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Horizon/Plan Bay Area 2050: Final Project Performance Findings
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Project ID	Row ID	Project	Project Type	Lifecycle Cost	Guiding Principle Flags	Provides Point of Access in CoC?	Equity Score		
							Rising Tides Falling Fortunes	Clean and Green	Back to the Future
3102	67	SR-4 Operational Improvements	Build Road Capacity - Low Cost	$0.5B	1	Yes	Challenges	Challenges	Even
2408	68	Muni Metro T-Third Extension to South San Francisco	Build Local Transit	$1.8B	0	Yes	Challenges	Challenges	Even
3003	69	San Francisco Arterial HOV and Freeway HOT Lanes	Optimize Existing Freeway Network	$1.3B	0	Yes	Challenges	Challenges	Even
2303	70	Caltrain Full Electrification and Blended System: High Growth	Optimize Existing Transit Network - High Cost	$31.3B	2	Yes	Challenges	Even	Challenges
2304	71	SMART Extension to Cloverdale	Extend Rail Network - Low Cost	$0.5B	0	No	Challenges	Even	Challenges
2302	72	Caltrain Full Electrification and Blended System: Moderate Growth	Optimize Existing Transit Network - High Cost	$24.6B	2	Yes	Challenges	Even	Challenges
2700	73	Bay Bridge West Span Bike Path	Enhance Alternate Modes	$0.8B	0	Yes	Even	Challenges	Challenges
2305	74	SMART to Solano (Novato to Suisun City, without sea level rise protections)	Extend Rail Network - Low Cost	$1.6B	0	Yes	Even	Challenges	Challenges
6003	75	I-80 Corridor Overhaul with Per-Mile Tolling	Optimize Existing Freeway Network	$3.9B	1	Yes	Even	Challenges	Challenges
6020	76	Regional Express (ReX) Bus Network + Optimized Express Lane Network	Optimize Existing Freeway Network	$41.0B	1	Yes	Challenges	Challenges	Challenges
2309	77	Altamont Corridor Vision Phase 1 (to San Joaquin Valley)	Extend Rail Network - High Cost	$4.6B	0	Yes	Challenges	Challenges	Challenges
4003	78	Cupertino-Mountain View-San Jose Elevated Maglev Rail Loop	Build Local Transit	$8.1B	1	Yes	Challenges	Challenges	Challenges
3200	79	SR-37 Long Term Project (Tolling, Elevation, Interchanges, Widening, Express Bus)	Resilience	$6.0B	2	Yes	Challenges	Challenges	Challenges
2310	80	Megaregional Rail Network + Resilience Project (Caltrain, ACE, Valley Link, Dumbarton, Cap Cor)	Build Core Rail	$54.1B	2	Yes	Challenges	Challenges	Challenges
2002	81	AC Transit Transbay Network: Capital Improvements + Service Increase	Optimize Existing Freeway Network	$6.5B	0	Yes	Challenges	Challenges	Challenges
2300	82	Caltrain Downtown Extension	Build Core Rail	$4.8B	0	No	Challenges	Challenges	Challenges
7002	83	I-580/US-101/SMART Marin Resilience Project	Resilience	$0.2B	0	Yes	Challenges	Challenges	Challenges
2203	84	BART to Hercules & I-80 Bus from Vallejo to Oakland	Extend Rail Network - High Cost	$5.8B	0	Yes	Challenges	Challenges	Challenges
3000	85	Regional Express Lanes (MTC + VTA + ACTC + US-101)	Build Road Capacity - High Cost	$12.1B	1	Yes	Challenges	Challenges	Challenges
5000	86	Bay Area Forward (Phase 1: Freeway Ramp and Arterial Components Only)	Optimize Existing Freeway Network	$0.6B	1	Yes	Challenges	Challenges	Challenges
2312	87	ACE Rail Service Increase (10 Daily Roundtrips)	Extend Rail Network - Low Cost	$1.3B	0	Yes	Challenges	Challenges	Challenges
3001	88	Treasure Island Congestion Pricing	Optimize Existing Transit Network - Low Cost	$0.8B	1	Yes	Challenges	Challenges	Challenges
6002	89	SMART to Richmond via New Richmond-San Rafael Bridge	Build Core Rail	$5.0B	2	Yes	Challenges	Challenges	Challenges
3002	90	Downtown San Francisco Congestion Pricing	Optimize Existing Transit Network - Low Cost	$0.3B	1	Yes	Challenges	Challenges	Challenges
6102	91	HOV Lane Network with per-mile fee for SOVs	Optimize Existing Freeway Network	$7.7B	1	Yes	Challenges	Challenges	Challenges
7003	92	US-101 Peninsula Resilience Project (San Antonio Rd, Poplar Ave, Millbrae Ave)	Resilience	$0.2B	0	Yes	Challenges	n/a	n/a
7006	93	I-880 Resilience Project (South Fremont)	Resilience	$0.1B	0	Yes	Challenges	n/a	n/a
7004	94	SR-84 Resilience Project (Dumbarton Bridge, 101 Interchange)	Resilience	$0.2B	0	Yes	Challenges	n/a	n/a
6004	95	Bay Trail Completion	Enhance Alternate Modes	n/a	0	Yes	cannot be modeled		
6005	96	Regional Bicycle Superhighway Network	Enhance Alternate Modes	n/a	0	Yes	cannot be modeled		
6105	97	Timing Regulation of Freight Delivery	Optimize Existing Freeway Network	n/a	1	Yes	cannot be modeled		

Equity Score

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

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

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

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

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

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

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

Questions to determine Guiding Principle flags:

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

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

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

Healthy: Does the project significantly increase emissions or collisions?

Vibrant: Does the project directly eliminate jobs?

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

Total number of projects: 97; 81 projects from public agencies, 12 projects (along with 4 alternate versions) from public/NGOs that were jury finalists from the Transformative Projects process.
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Project Type	Project ID	Row ID	Project	Affordable	Connected	Diverse	Healthy	Vibrant
Optimize Existing Transit Network - Low Cost	3002	36	Downtown San Francisco Congestion Pricing	Does Not Support	Supports	Supports	Supports	Supports
	2007	37	San Francisco Southeast Waterfront Transit Improvements	Supports	Supports	Supports	Supports	Supports
	2100	38	San Pablo BRT	Supports	Supports	Supports	Supports	Supports
	2008	39	Alameda Point Transit Network Improvements	Supports	Supports	Supports	Supports	Supports
	2000	40	AC Transit Local Network: Service Increase	Supports	Supports	Supports	Supports	Supports
	2101	41	Geary BRT (Phase 2)	Supports	Supports	Supports	Supports	Supports
	2105	42	Alameda County E14th St/Mission and Fremont Blvd Multimodal Corridor	Supports	Supports	Supports	Supports	Supports
	2103	43	SamTrans El Camino Real BRT: Capital and Service Improvements	Supports	Supports	Supports	Supports	Supports
	2003	44	Muni Forward: Capital Improvements + Service Increase	Supports	Supports	Supports	Supports	Supports
	6100	45	Integrated Transit Fare System	Supports	Supports	Supports	Supports	Supports
	2004	46	Sonoma Countywide Bus: Service Increase	Supports	Supports	Supports	Supports	Supports
	2400	47	Downtown San Jose LRT Subway	Supports	Supports	Supports	Supports	Supports
	6106	48	Free Transit for Low-Income Households	Supports	Supports	Supports	Supports	Supports
	6101	49	Free Transit for All	Supports	Supports	Supports	Supports	Does Not Support
Build Local Transit	4000	50	Oakland/Alameda Gondola Network	Supports	Supports	Supports	Supports	Does Not Support
	4001	51	Mountain View AV Network (Free Fare, Subsidies from Companies)	Supports	Supports	Supports	Supports	Does Not Support
	2403	52	Vasona LRT Extension (Phase 2)	Supports	Supports	Supports	Supports	Supports
	2412	53	SR-85 LRT (Mountain View to US101 interchange)	Supports	Supports	Supports	Supports	Supports
	2408	54	Muni Metro T-Third Extension to South San Francisco	Supports	Supports	Supports	Supports	Supports
	4002	55	Contra Costa Autonomous Shuttle Program	Supports	Supports	Supports	Supports	Supports
	4003	56	Cupertino-Mountain View-San Jose Elevated Maglev Rail Loop	Supports	Supports	Supports	Supports	Does Not Support
	2402	57	San Jose Airport People Mover	Supports	Supports	Supports	Supports	Supports
Enhance Alternate Modes	2600	58	WETA Ferry Service Frequency Increase	Supports	Supports	Supports	Supports	Supports
	6006	59	Enhanced Regionwide Bike Infrastructure	Supports	Supports	Supports	Supports	Supports
	2602	60	WETA Ferry Service: Berkeley - San Francisco	Supports	Supports	Supports	Supports	Supports
	2700	61	Bay Bridge West Span Bike Path	Supports	Supports	Supports	Supports	Supports
	2603	62	WETA Ferry Service: Redwood City - San Francisco - Oakland	Supports	Supports	Supports	Supports	Supports
	4004	63	Regional Hovercraft Network	Supports	Supports	Supports	Supports	Supports
	6004	64	Bay Trail Completion	Supports	Supports	Supports	Supports	Supports
	6005	65	Regional Bicycle Superhighway Network	Supports	Supports	Supports	Supports	Supports
Build Road Capacity - High Cost	1001	66	Southern Crossing Bridge + New San Francisco-Oakland Transbay Rail Crossing - BART (Crossing 6)	Supports	Supports	Does Not Support	Supports	Supports
	3000	67	Regional Express Lanes (MTC + VTA + ACTC + US-101)	Supports	Supports	Supports	Does Not Support	Supports
	1005	68	Mid-Bay Bridge (I-238 to I-380) (Crossing 2)	Supports	Supports	Supports	Does Not Support	Does Not Support
	1006	69	San Mateo Bridge Reconstruction and Widening (Crossing 1)	Supports	Supports	Supports	Does Not Support	Supports
Build Road	3101	70	I-680/SR-4 Interchange Improvements (Direct/HOV Connectors, Ramp Widening, Auxiliary Lanes)	Supports	Supports	Supports	Does Not Support	Supports

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Questions to determine Guiding Principle flags:

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

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

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

Healthy: Does the project significantly increase emissions or collisions?

Vibrant: Does the project directly eliminate jobs?

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

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Questions to determine Guiding Principle flags:

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

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

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

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All values in billions of 2019 dollars discounted present value

Project Type	Project ID	Row ID	Project	Future	Grand Total	Accessibility Benefits	Transit Crowding Benefits	Freeway Reliability and Vehicle Ownership Benefits	Environmental Benefits	Health Benefits	Safety Benefits
Build Core Rail	1004	1	New San Francisco-Oakland Transbay Rail Crossing - Commuter Rail (Crossing 5)	Rising Tides Falling Fortunes	**$30.7B**	$14.0B	$7.1B	$1.6B	$0.3B	$5.8B	$1.9B
				Clean and Green	**$79.3B**	$48.4B	$18.6B	$2.1B	$0.0B	$8.6B	$1.6B
				Back to the Future	**$98.0B**	$64.6B	$17.8B	$3.7B	$0.2B	$9.1B	$2.6B
	1007	2	New San Francisco-Oakland Transbay Rail Crossing - BART + Commuter Rail (Crossing 7)	Rising Tides Falling Fortunes	**$47.1B**	$20.9B	$10.6B	$3.0B	$0.4B	$9.7B	$2.4B
				Clean and Green	**$121.0B**	$68.0B	$34.2B	$3.6B	($0.1B)	$13.1B	$2.1B
				Back to the Future	**$114.0B**	$71.8B	$22.0B	$5.3B	$0.2B	$11.9B	$2.7B
	1002	3	New San Francisco-Oakland Transbay Rail Crossing - BART (Crossing 3: Mission St)	Rising Tides Falling Fortunes	**$21.3B**	$6.6B	$7.9B	$1.9B	$0.1B	$4.1B	$0.6B
				Clean and Green	**$45.4B**	$19.0B	$18.8B	$2.0B	$0.0B	$5.2B	$0.5B
				Back to the Future	**$42.3B**	$19.9B	$15.3B	$2.1B	$0.1B	$4.4B	$0.6B
	1003	4	New San Francisco-Oakland Transbay Rail Crossing - BART (Crossing 4: New Markets)	Rising Tides Falling Fortunes	**$21.6B**	$7.0B	$7.2B	$1.9B	$0.2B	$4.6B	$0.7B
				Clean and Green	**$47.3B**	$19.3B	$19.8B	$1.8B	$0.0B	$6.0B	$0.5B
				Back to the Future	**$42.7B**	$19.2B	$15.8B	$2.1B	$0.1B	$4.9B	$0.7B
	2300	5	Caltrain Downtown Extension	Rising Tides Falling Fortunes	**$1.9B**	$1.4B	$0.2B	$0.0B	$0.0B	$0.2B	$0.1B
				Clean and Green	**$3.4B**	$3.2B	($0.1B)	$0.0B	$0.0B	$0.1B	$0.1B
				Back to the Future	**$3.0B**	$2.4B	$0.8B	($0.3B)	$0.0B	$0.0B	$0.1B
	2205	6	BART to Silicon Valley (Phase 2)	Rising Tides Falling Fortunes	**$0.5B**	$0.3B	($0.3B)	$0.2B	$0.0B	$0.1B	$0.2B
				Clean and Green	**$2.3B**	$1.8B	($0.1B)	$0.2B	$0.0B	$0.3B	$0.2B
				Back to the Future	**$3.7B**	$3.5B	($1.5B)	$1.1B	$0.0B	$0.4B	$0.2B
	2306	7	Dumbarton Rail (Redwood City to Union City)	Rising Tides Falling Fortunes	**($0.5B)**	$0.3B	($0.2B)	($0.6B)	($0.3B)	$0.1B	$0.1B
				Clean and Green	**$0.8B**	$0.9B	($0.3B)	$0.3B	($0.3B)	$0.1B	$0.1B
				Back to the Future	**$1.9B**	$1.7B	$0.3B	$0.0B	($0.3B)	$0.0B	$0.1B
	2310	8	Megaregional Rail Network + Resilience Project (Caltrain, ACE, Valley Link, Dumbarton, Cap Cor)	Rising Tides Falling Fortunes	**$9.0B**	$5.6B	$1.9B	$0.7B	($0.7B)	$0.9B	$0.6B
				Clean and Green	**$26.8B**	$14.0B	$10.7B	$1.0B	($0.8B)	$1.3B	$0.6B
				Back to the Future	**$21.5B**	$14.6B	$4.4B	$1.6B	($0.8B)	$1.1B	$0.7B
	2208	9	BART Gap Closure (Millbrae to Silicon Valley)	Rising Tides Falling Fortunes	**$0.5B**	$0.3B	($0.2B)	$0.1B	$0.0B	$0.1B	$0.1B
				Clean and Green	**$3.8B**	$1.7B	$1.3B	$0.4B	$0.0B	$0.3B	$0.2B
				Back to the Future	**$5.4B**	$3.7B	$0.1B	$1.0B	$0.0B	$0.3B	$0.3B
	6002	10	SMART to Richmond via New Richmond-San Rafael Bridge	Rising Tides Falling Fortunes	**($0.2B)**	$0.1B	($0.4B)	$0.0B	$0.0B	$0.1B	$0.1B
				Clean and Green	**$0.9B**	$0.8B	($0.1B)	$0.0B	$0.0B	$0.1B	$0.1B
				Back to the Future	**$0.8B**	$1.2B	($0.8B)	$0.3B	$0.0B	$0.0B	$0.1B
Extend Rail	2308	11	Valley Link (Dublin to San Joaquin Valley)	Rising Tides Falling Fortunes	**$0.6B**	$0.7B	($0.4B)	($0.4B)	$0.0B	$0.5B	$0.2B

Methodology Overview: All project impacts are measured against a uniform base transportation and land use network in each future, except Resilience projects, which are measured against a baseline where that asset is out of service (hence n/a in some futures).
Inter-regional projects: Modeled Bay Area benefits have been multiplied by a factor to reflect the ratio of expected ridership from outside the region. Valley Link/ACE Rail benefit multiplier: 3.3; Caltrain/HSR benefit multiplier: 1.3 (the HSR multiplier is applied in Clean and Green only, the Future where HSR is completely built out).
Description of benefits:
Accessibility Benefits: Represents change in accessibility benefits to all Bay Area residents as a result of the project.
Transit Crowding Benefits: Captures the (dis)benefits associated with increase/decrease in crowding, since people may change their travel choices or be denied boarding, or experience discomfort in a crowded vehicle.
Freeway Reliability and Vehicle Ownership Benefits: Reflects change in non-recurring vehicle delay on freeways, and the costs of change in vehicle ownership as a result of the project.
Environmental Benefits: Captures monetary value of change in GHG emissions or impact on natural lands (wetlands, pastureland, farmland) due to the project.
Health Benefits: Represents benefits from increased physical activity due to more walking/biking and reduction in air pollutants and noise.
Safety Benefits: Captures decrease in injuries and collisions due to reduced VMT as well as operational and safety improvements such as freewayramp redesign or grade separations.
Note: Societal transfers such as fare/toll revenue (or loss) are excluded from both benefits and costs, following standard practice for societal benefit-cost analyses. For Project IDs 6111 and 6112, benefit values include benefits from a suite of transit capacity expansion projects; however, only the incremental benefits of the project are used for the calculation of the Benefit-Cost Ratio in Attachment A.
(Full methodology can be found here: https://mtc.ca.gov/sites/default/files/ProjectPerformance_Methodology.pdf)

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Project Type	Project ID	Row ID	Project	Future	Grand Total	Accessibility Benefits	Transit Crowding Benefits	Freeway Reliability and Vehicle Ownership Benefits	Environmental Benefits	Health Benefits	Safety Benefits
Extend Rail Network - High Cost	2308	11	Valley Link (Dublin to San Joaquin Valley)	Clean and Green	**$4.2B**	$2.0B	$2.0B	$0.0B	$0.0B	$0.2B	$0.1B
				Back to the Future	**$3.7B**	$3.2B	($0.6B)	$0.4B	$0.0B	$0.3B	$0.3B
	2309	12	Altamont Corridor Vision Phase 1 (to San Joaquin Valley)	Rising Tides Falling Fortunes	**$1.2B**	$0.6B	($0.4B)	$0.0B	$0.1B	$0.5B	$0.4B
				Clean and Green	**$2.9B**	$3.9B	($2.1B)	$0.5B	$0.0B	$0.3B	$0.3B
				Back to the Future	**$3.3B**	$1.5B	($0.1B)	$0.8B	$0.0B	$0.6B	$0.4B
	2206	13	BART Extension from Diridon to Cupertino	Rising Tides Falling Fortunes	**$1.1B**	$0.6B	($0.2B)	$0.3B	$0.0B	$0.2B	$0.1B
				Clean and Green	**$2.9B**	$1.8B	$0.4B	$0.0B	$0.0B	$0.4B	$0.2B
				Back to the Future	**$5.1B**	$4.5B	($0.4B)	$0.3B	$0.0B	$0.5B	$0.2B
	2207	14	BART Extension from Diridon to Gilroy (replacing existing Caltrain)	Rising Tides Falling Fortunes	**$0.3B**	$0.3B	($0.1B)	$0.1B	$0.0B	$0.0B	$0.0B
				Clean and Green	**$2.0B**	$0.8B	$0.6B	$0.4B	$0.0B	$0.2B	$0.1B
				Back to the Future	**$3.0B**	$1.9B	$0.2B	$0.5B	$0.0B	$0.3B	$0.1B
	2204	15	BART on I-680 (Walnut Creek to West Dublin/Pleasanton)	Rising Tides Falling Fortunes	**($0.2B)**	($0.1B)	($0.2B)	$0.2B	$0.0B	$0.0B	$0.0B
				Clean and Green	**$1.6B**	$0.6B	$1.0B	$0.0B	$0.0B	$0.0B	$0.0B
				Back to the Future	**$0.2B**	$0.3B	$0.0B	$0.0B	$0.0B	$0.0B	$0.0B
	2203	16	BART to Hercules & I-80 Bus from Vallejo to Oakland	Rising Tides Falling Fortunes	**$0.4B**	$0.8B	($1.0B)	$0.1B	$0.1B	$0.3B	$0.2B
				Clean and Green	**$0.1B**	$1.4B	($1.6B)	($0.1B)	$0.0B	$0.2B	$0.1B
				Back to the Future	**$1.4B**	$1.4B	($0.6B)	$0.3B	$0.0B	$0.1B	$0.1B
Extend Rail Network - Low Cost	2312	17	ACE Rail Service Increase (10 Daily Roundtrips)	Rising Tides Falling Fortunes	**$0.5B**	$0.0B	$0.0B	($0.2B)	$0.0B	$0.4B	$0.3B
				Clean and Green	**$1.8B**	$2.8B	($1.5B)	$0.5B	$0.0B	($0.2B)	$0.2B
				Back to the Future	**$1.9B**	$2.6B	$0.7B	($1.1B)	$0.0B	($0.3B)	($0.1B)
	2202	18	BART DMU Extension to Brentwood	Rising Tides Falling Fortunes	**($0.2B)**	$0.1B	($0.1B)	($0.2B)	$0.0B	$0.1B	$0.0B
				Clean and Green	**$0.3B**	$0.3B	($0.2B)	$0.1B	$0.0B	$0.1B	$0.0B
				Back to the Future	**($0.1B)**	$0.1B	($0.2B)	$0.0B	$0.0B	$0.0B	$0.0B
	2305	19	SMART to Solano (Novato to Suisun City, without sea level rise protections)	Rising Tides Falling Fortunes	**($0.1B)**	$0.1B	($0.1B)	($0.1B)	$0.0B	$0.0B	$0.0B
				Clean and Green	**$0.2B**	$0.2B	$0.0B	($0.1B)	$0.0B	$0.0B	$0.1B
				Back to the Future	**$0.0B**	($0.4B)	$0.2B	$0.2B	$0.0B	$0.1B	$0.0B
	2304	20	SMART Extension to Cloverdale	Rising Tides Falling Fortunes	**$0.1B**	$0.2B	($0.1B)	($0.2B)	$0.0B	$0.1B	$0.0B
				Clean and Green	**$0.1B**	$0.0B	$0.1B	($0.1B)	$0.0B	$0.0B	$0.0B
				Back to the Future	**($0.4B)**	($0.4B)	($0.4B)	$0.2B	$0.0B	$0.1B	$0.0B
Optimize Existing Transit Network - High Cost	2201	21	BART Core Capacity	Rising Tides Falling Fortunes	**$4.4B**	$0.7B	$3.0B	$0.4B	$0.0B	$0.2B	$0.1B
				Clean and Green	**$9.8B**	$1.5B	$7.9B	$0.0B	$0.0B	$0.3B	$0.1B

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Health Benefits: Represents benefits from increased physical activity due to more walking/biking and reduction in air pollutants and noise.
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Note: Societal transfers such as fare/toll revenue (or loss) are excluded from both benefits and costs, following standard practice for societal benefit-cost analyses. For Project IDs 6111 and 6112, benefit values include benefits from a suite of transit capacity expansion projects; however, only the incremental benefits of the project are used for the calculation of the Benefit-Cost Ratio in Attachment A.
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Horizon/Plan Bay Area 2050: Final Project Performance Findings
Attachment D: Detailed Table of Lifecycle Benefits by Future

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All values in billions of 2019 dollars discounted present value

Project Type	Project ID	Row ID	Project	Future	Grand Total	Accessibility Benefits	Transit Crowding Benefits	Freeway Reliability and Vehicle Ownership Benefits	Environmental Benefits	Health Benefits	Safety Benefits
Optimize Existing Transit Network - High Cost	2201	21	BART Core Capacity	Back to the Future	**$10.2B**	$2.8B	$6.6B	$0.6B	$0.0B	$0.2B	$0.1B
	2001	22	AC Transit Local Rapid Network: Capital Improvements + Service Increase	Rising Tides Falling Fortunes	**$3.5B**	$0.6B	$0.0B	$2.1B	$0.1B	$0.3B	$0.4B
				Clean and Green	**$3.9B**	$1.3B	($0.6B)	$2.4B	$0.0B	$0.4B	$0.4B
				Back to the Future	**$5.3B**	$2.7B	($1.3B)	$2.8B	$0.0B	$0.4B	$0.7B
	2303	23	Caltrain Full Electrification and Blended System: High Growth	Rising Tides Falling Fortunes	**$8.1B**	$4.5B	$1.7B	$0.4B	$0.1B	$0.5B	$1.0B
				Clean and Green	**$30.3B**	$15.5B	$11.7B	$0.7B	$0.0B	$1.1B	$1.3B
				Back to the Future	**$16.0B**	$9.8B	$3.5B	$1.0B	$0.0B	$0.8B	$0.9B
	2302	24	Caltrain Full Electrification and Blended System: Moderate Growth	Rising Tides Falling Fortunes	**$6.8B**	$3.6B	$1.7B	$0.3B	$0.1B	$0.3B	$0.8B
				Clean and Green	**$22.9B**	$12.2B	$8.5B	$0.4B	$0.0B	$0.8B	$1.0B
				Back to the Future	**$12.7B**	$7.8B	$2.7B	$0.8B	$0.0B	$0.5B	$0.8B
	2005	25	Alameda County BRT Network + Connected Vehicle Corridors	Rising Tides Falling Fortunes	**$1.0B**	$0.4B	($0.2B)	$0.3B	$0.0B	$0.3B	$0.1B
				Clean and Green	**$1.5B**	$0.4B	($0.2B)	$1.0B	$0.0B	$0.2B	$0.1B
				Back to the Future	**$2.6B**	$1.6B	$0.1B	$0.7B	$0.0B	$0.1B	$0.2B
	2410	26	VTA LRT Systemwide Grade Separation and Full Automation	Rising Tides Falling Fortunes	**$1.9B**	$0.6B	($0.6B)	$0.9B	$0.0B	$0.4B	$0.6B
				Clean and Green	**$5.7B**	$3.4B	($0.4B)	$1.3B	$0.0B	$0.8B	$0.7B
				Back to the Future	**$10.2B**	$6.2B	($0.1B)	$2.3B	$0.0B	$1.0B	$0.7B
	2409	27	VTA LRT Systemwide Grade Separation	Rising Tides Falling Fortunes	**$0.7B**	($0.1B)	($0.2B)	$0.4B	$0.0B	$0.2B	$0.4B
				Clean and Green	**$2.6B**	$1.1B	$0.5B	$0.3B	$0.0B	$0.3B	$0.4B
				Back to the Future	**$5.6B**	$2.9B	$1.1B	$0.7B	$0.0B	$0.3B	$0.5B
	2401	28	North San Jose LRT Subway	Rising Tides Falling Fortunes	**$0.0B**	($0.1B)	($0.2B)	$0.3B	$0.0B	$0.0B	$0.1B
				Clean and Green	**$0.7B**	($0.4B)	$0.7B	$0.1B	$0.0B	$0.2B	$0.2B
				Back to the Future	**$2.4B**	$1.2B	$0.2B	$0.6B	$0.0B	$0.3B	$0.2B
	2411	29	VTA LRT Systemwide Grade Separation, Network Expansion, and Full Automation	Rising Tides Falling Fortunes	**$4.2B**	$1.9B	($0.9B)	$1.1B	$0.1B	$1.1B	$0.9B
				Clean and Green	**$9.1B**	$5.6B	($1.9B)	$2.4B	$0.0B	$2.1B	$0.8B
				Back to the Future	**$16.0B**	$10.3B	($0.9B)	$3.0B	$0.1B	$2.5B	$1.1B
	2407	30	Muni Metro Southwest M-Line Subway	Rising Tides Falling Fortunes	**$0.4B**	($0.2B)	$0.4B	$0.1B	$0.0B	$0.0B	$0.0B
				Clean and Green	**$1.4B**	($0.3B)	$1.7B	($0.1B)	$0.0B	$0.0B	$0.0B
				Back to the Future	**$2.0B**	$0.2B	$1.2B	$0.4B	$0.0B	$0.2B	$0.0B
	2301	31	Caltrain Full Electrification and Blended System: Base Growth	Rising Tides Falling Fortunes	**$3.1B**	$1.1B	$1.2B	$0.1B	$0.0B	$0.1B	$0.6B
				Clean and Green	**$4.9B**	$3.5B	$0.6B	$0.0B	$0.0B	$0.1B	$0.8B
				Back to the Future	**$4.4B**	$2.4B	$1.2B	$0.2B	$0.0B	$0.0B	$0.6B

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All values in billions of 2019 dollars discounted present value

Project Type	Project ID	Row ID	Project	Future	Grand Total	Accessibility Benefits	Transit Crowding Benefits	Freeway Reliability and Vehicle Ownership Benefits	Environmental Benefits	Health Benefits	Safety Benefits
Optimize Existing Transit Network - Low Cost	3001	32	Treasure Island Congestion Pricing	Rising Tides Falling Fortunes	**$6.2B**	$5.4B	($0.6B)	$0.7B	$0.1B	$0.3B	$0.3B
				Clean and Green	**$5.6B**	$5.4B	($0.6B)	$0.3B	$0.0B	$0.3B	$0.1B
				Back to the Future	**$11.3B**	$9.2B	$0.2B	$1.2B	$0.1B	$0.2B	$0.4B
	6111	33	Integrated Transit Fare System (with Transit Capacity Expansion)	Rising Tides Falling Fortunes	**$21.4B**	$7.8B	$6.4B	$3.0B	$0.2B	$1.6B	$2.3B
				Clean and Green	**$44.9B**	$20.4B	$16.2B	$3.7B	$0.0B	$2.4B	$2.2B
				Back to the Future	**$44.1B**	$23.5B	$11.4B	$4.8B	$0.1B	$1.8B	$2.5B
	6112	34	Integrated Transit Fare System and Seamless Transfers (with Transit Capacity Expansion)	Rising Tides Falling Fortunes	**$22.0B**	$8.3B	$5.9B	$3.3B	$0.3B	$1.7B	$2.4B
				Clean and Green	**$46.2B**	$21.8B	$15.5B	$4.0B	$0.0B	$2.6B	$2.3B
				Back to the Future	**$45.9B**	$25.0B	$11.1B	$5.0B	$0.1B	$2.0B	$2.5B
	2209	35	Irvington BART Infill Station	Rising Tides Falling Fortunes	**$0.3B**	$0.1B	$0.2B	$0.0B	$0.0B	($0.1B)	$0.1B
				Clean and Green	**$0.2B**	$0.8B	($0.9B)	$0.1B	$0.0B	$0.1B	$0.1B
				Back to the Future	**$2.1B**	$2.1B	$0.2B	($0.2B)	$0.0B	$0.0B	$0.1B
	3002	36	Downtown San Francisco Congestion Pricing	Rising Tides Falling Fortunes	**$0.7B**	$0.2B	$0.3B	$0.2B	$0.0B	$0.0B	$0.0B
				Clean and Green	**$0.9B**	$0.4B	$0.4B	($0.1B)	$0.0B	$0.1B	$0.0B
				Back to the Future	**$1.4B**	$0.5B	$0.4B	$0.4B	$0.0B	$0.1B	$0.0B
	2007	37	San Francisco Southeast Waterfront Transit Improvements	Rising Tides Falling Fortunes	**$1.0B**	$0.4B	$0.5B	$0.2B	$0.0B	($0.1B)	$0.0B
				Clean and Green	**$1.6B**	$0.2B	$1.4B	$0.0B	$0.0B	($0.1B)	$0.0B
				Back to the Future	**$2.2B**	$0.8B	$1.1B	$0.4B	$0.0B	($0.1B)	$0.0B
	2100	38	San Pablo BRT	Rising Tides Falling Fortunes	**$0.6B**	$0.2B	($0.1B)	$0.0B	$0.0B	$0.2B	$0.3B
				Clean and Green	**$1.2B**	$0.2B	$0.5B	$0.2B	$0.0B	$0.1B	$0.3B
				Back to the Future	**$1.6B**	$0.6B	$0.2B	$0.3B	$0.0B	$0.2B	$0.3B
	2008	39	Alameda Point Transit Network Improvements	Rising Tides Falling Fortunes	**$0.4B**	$0.2B	$0.1B	$0.0B	$0.0B	$0.1B	$0.0B
				Clean and Green	**$1.4B**	$0.3B	$1.0B	$0.0B	$0.0B	$0.0B	$0.0B
				Back to the Future	**$1.8B**	$1.5B	$0.0B	$0.3B	$0.0B	$0.1B	$0.0B
	2000	40	AC Transit Local Network: Service Increase	Rising Tides Falling Fortunes	**$3.2B**	$0.5B	$0.5B	$1.6B	$0.0B	$0.3B	$0.3B
				Clean and Green	**$5.9B**	$1.7B	$1.9B	$1.7B	$0.0B	$0.3B	$0.2B
				Back to the Future	**$5.9B**	$3.5B	($0.2B)	$1.9B	$0.0B	$0.3B	$0.2B
	2101	41	Geary BRT (Phase 2)	Rising Tides Falling Fortunes	**$0.9B**	$0.1B	$0.5B	($0.1B)	$0.0B	$0.1B	$0.3B
				Clean and Green	**$1.0B**	$0.1B	$0.8B	$0.0B	$0.0B	$0.1B	$0.1B
				Back to the Future	**$1.8B**	$0.7B	$0.4B	$0.4B	$0.0B	$0.1B	$0.1B
	2105	42	Alameda County E14th St/Mission and Fremont Blvd	Rising Tides Falling Fortunes	**$0.6B**	$0.3B	($0.3B)	$0.2B	$0.0B	$0.2B	$0.2B

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Optimize Existing Transit Network - Low Cost	2105	42	Alameda County E14th St/Mission and Fremont Blvd Multimodal Corridor	Clean and Green	**$1.1B**	$0.3B	$0.0B	$0.5B	$0.0B	$0.1B	$0.1B
				Back to the Future	**$0.8B**	$0.4B	($0.2B)	$0.3B	$0.0B	$0.1B	$0.2B
	2103	43	SamTrans El Camino Real BRT: Capital and Service Improvements	Rising Tides Falling Fortunes	**$0.6B**	($0.1B)	$0.4B	$0.1B	$0.0B	$0.1B	$0.1B
				Clean and Green	**$0.7B**	$0.4B	$0.0B	$0.2B	$0.0B	$0.0B	$0.1B
				Back to the Future	**$1.0B**	$0.5B	$0.8B	($0.3B)	$0.0B	$0.0B	$0.0B
	2003	44	Muni Forward: Capital Improvements + Service Increase	Rising Tides Falling Fortunes	**$2.0B**	$0.6B	$0.8B	$0.1B	$0.0B	($0.1B)	$0.6B
				Clean and Green	**$4.4B**	$0.7B	$2.8B	$0.5B	$0.0B	($0.1B)	$0.6B
				Back to the Future	**$3.4B**	$0.6B	$2.1B	$0.3B	$0.0B	($0.1B)	$0.6B
	6100	45	Integrated Transit Fare System	Rising Tides Falling Fortunes	**$0.7B**	$0.8B	($1.5B)	$0.5B	$0.1B	$0.4B	$0.4B
				Clean and Green	**($1.4B)**	$3.0B	($5.9B)	$0.5B	$0.0B	$0.6B	$0.4B
				Back to the Future	**$1.6B**	$2.6B	($2.4B)	$0.8B	$0.0B	$0.2B	$0.3B
	2004	46	Sonoma Countywide Bus: Service Increase	Rising Tides Falling Fortunes	**$0.2B**	$0.0B	$0.0B	$0.0B	$0.0B	$0.1B	$0.1B
				Clean and Green	**$0.2B**	$0.0B	($0.2B)	$0.4B	$0.0B	$0.0B	$0.1B
				Back to the Future	**$1.3B**	$0.7B	$0.2B	$0.4B	$0.0B	$0.0B	$0.0B
	2400	47	Downtown San Jose LRT Subway	Rising Tides Falling Fortunes	**$0.2B**	$0.0B	($0.2B)	$0.4B	$0.0B	$0.0B	$0.0B
				Clean and Green	**$0.3B**	$0.2B	($0.2B)	$0.2B	$0.0B	$0.1B	$0.0B
				Back to the Future	**$2.5B**	$1.5B	$0.1B	$0.6B	$0.0B	$0.2B	$0.1B
	6106	48	Free Transit for Low-Income Households	Rising Tides Falling Fortunes	**($17.3B)**	($11.2B)	($13.8B)	$1.1B	$0.4B	$3.8B	$2.3B
				Clean and Green	**($23.9B)**	$2.5B	($31.1B)	$0.8B	$0.0B	$2.8B	$1.2B
				Back to the Future	**($15.1B)**	$0.4B	($20.1B)	$0.7B	$0.1B	$2.6B	$1.3B
	6101	49	Free Transit for All	Rising Tides Falling Fortunes	**($50.3B)**	($34.9B)	($33.5B)	$3.9B	$1.1B	$7.6B	$5.5B
				Clean and Green	**($113.2B)**	($39.9B)	($89.9B)	$3.1B	($0.1B)	$9.3B	$4.2B
				Back to the Future	**($66.7B)**	($12.6B)	($75.8B)	$7.3B	$0.6B	$8.4B	$5.4B
Build Local Transit	4000	50	Oakland/Alameda Gondola Network	Rising Tides Falling Fortunes	**$0.8B**	$0.5B	($0.1B)	$0.1B	$0.0B	$0.2B	$0.1B
				Clean and Green	**$0.3B**	$0.1B	($0.1B)	$0.0B	$0.0B	$0.3B	$0.1B
				Back to the Future	**$2.4B**	$2.0B	($0.6B)	$0.5B	$0.0B	$0.4B	$0.1B
	4001	51	Mountain View AV Network (Free Fare, Subsidies from Companies)	Rising Tides Falling Fortunes	**$0.4B**	$0.1B	($0.1B)	$0.0B	$0.0B	$0.2B	$0.1B
				Clean and Green	**$1.2B**	$0.8B	($0.1B)	$0.4B	$0.0B	$0.0B	$0.0B
				Back to the Future	**$1.5B**	$0.8B	$0.2B	$0.3B	$0.0B	$0.1B	$0.1B
	2403	52	Vasona LRT Extension (Phase 2)	Rising Tides Falling Fortunes	**$0.2B**	($0.1B)	($0.1B)	$0.4B	$0.0B	$0.0B	$0.0B
				Clean and Green	**$0.1B**	$0.2B	$0.0B	($0.1B)	$0.0B	$0.0B	$0.0B

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All values in billions of 2019 dollars discounted present value

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Build Local Transit	2403	52	Vasona LRT Extension (Phase 2)	Back to the Future	**$0.4B**	$0.4B	($0.4B)	$0.4B	$0.0B	$0.0B	$0.0B
	2412	53	SR-85 LRT (Mountain View to US101 interchange)	Rising Tides Falling Fortunes	**$1.0B**	$0.5B	$0.0B	$0.2B	$0.0B	$0.3B	$0.1B
				Clean and Green	**$2.5B**	$0.8B	$1.1B	$0.2B	$0.0B	$0.3B	$0.1B
				Back to the Future	**$2.3B**	$1.8B	$0.0B	$0.3B	$0.0B	$0.2B	$0.1B
	2408	54	Muni Metro T-Third Extension to South San Francisco	Rising Tides Falling Fortunes	**($0.2B)**	$0.0B	($0.4B)	$0.2B	$0.0B	$0.0B	$0.0B
				Clean and Green	**$0.6B**	$0.0B	$0.5B	$0.0B	$0.0B	$0.1B	$0.1B
				Back to the Future	**$1.7B**	$1.0B	$0.2B	$0.4B	$0.0B	$0.0B	$0.1B
	4002	55	Contra Costa Autonomous Shuttle Program	Rising Tides Falling Fortunes	**$0.7B**	$0.1B	($0.1B)	$0.4B	$0.0B	$0.2B	$0.1B
				Clean and Green	**$1.2B**	$0.1B	$0.0B	$0.6B	$0.0B	$0.3B	$0.1B
				Back to the Future	**$0.9B**	$0.4B	($0.1B)	$0.2B	$0.0B	$0.3B	$0.1B
	4003	56	Cupertino-Mountain View-San Jose Elevated Maglev Rail Loop	Rising Tides Falling Fortunes	**$0.4B**	$0.5B	($0.2B)	$0.0B	$0.0B	$0.0B	$0.0B
				Clean and Green	**$2.5B**	$0.9B	$1.2B	$0.3B	$0.0B	$0.1B	$0.0B
				Back to the Future	**$2.7B**	$0.9B	$1.3B	$0.2B	$0.0B	$0.2B	$0.0B
	2402	57	San Jose Airport People Mover	Rising Tides Falling Fortunes	**$0.4B**	$0.1B	$0.0B	$0.2B	$0.0B	$0.0B	$0.1B
				Clean and Green	**$0.6B**	$0.1B	$0.4B	$0.2B	$0.0B	($0.1B)	$0.0B
				Back to the Future	**($0.7B)**	($0.8B)	$0.0B	$0.1B	$0.0B	$0.1B	$0.0B
Enhance Alternate Modes	2600	58	WETA Ferry Service Frequency Increase	Rising Tides Falling Fortunes	**$0.7B**	$0.1B	$0.4B	$0.2B	$0.0B	$0.0B	$0.0B
				Clean and Green	**$2.4B**	$0.5B	$1.5B	$0.2B	$0.0B	$0.2B	$0.1B
				Back to the Future	**$0.9B**	$0.4B	$0.5B	$0.1B	$0.0B	$0.0B	($0.1B)
	6006	59	Enhanced Regionwide Bike Infrastructure	Rising Tides Falling Fortunes	**$13.7B**	$9.8B	$1.0B	$0.0B	$0.2B	$1.2B	$1.4B
				Clean and Green	**$36.1B**	$28.5B	$4.3B	$0.6B	$0.0B	$1.6B	$1.2B
				Back to the Future	**$40.0B**	$31.1B	$4.0B	$1.3B	$0.1B	$1.8B	$1.7B
	2602	60	WETA Ferry Service: Berkeley - San Francisco	Rising Tides Falling Fortunes	**($0.2B)**	($0.1B)	$0.0B	($0.5B)	$0.0B	$0.1B	$0.1B
				Clean and Green	**$0.3B**	($0.1B)	$0.4B	($0.1B)	$0.0B	$0.0B	$0.0B
				Back to the Future	**$0.3B**	($0.7B)	$0.9B	$0.1B	$0.0B	($0.1B)	$0.1B
	2700	61	Bay Bridge West Span Bike Path	Rising Tides Falling Fortunes	**($0.5B)**	($0.2B)	$0.0B	($0.2B)	$0.0B	$0.0B	$0.0B
				Clean and Green	**$1.1B**	$0.7B	$0.2B	$0.1B	$0.0B	$0.0B	$0.0B
				Back to the Future	**$0.4B**	$0.1B	($0.2B)	$0.4B	$0.0B	$0.1B	$0.0B
	2603	62	WETA Ferry Service: Redwood City - San Francisco - Oakland	Rising Tides Falling Fortunes	**$0.2B**	$0.0B	$0.1B	($0.2B)	$0.0B	$0.2B	$0.1B
				Clean and Green	**$0.2B**	$0.2B	($0.1B)	$0.0B	$0.0B	$0.0B	$0.0B
				Back to the Future	**($0.7B)**	($0.5B)	($0.2B)	$0.0B	$0.0B	$0.0B	$0.0B

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Enhance Alternate Modes	4004	63	Regional Hovercraft Network	Rising Tides Falling Fortunes	**$0.4B**	$0.1B	$0.3B	($0.2B)	$0.0B	$0.2B	$0.1B
				Clean and Green	**$1.5B**	$0.3B	$0.9B	$0.2B	$0.0B	$0.0B	$0.0B
				Back to the Future	**$0.9B**	$0.0B	$0.5B	$0.2B	$0.0B	$0.1B	$0.1B
Build Road Capacity - High Cost	1001	66	Southern Crossing Bridge + New San Francisco-Oakland Transbay Rail Crossing - BART (Crossing 6)	Rising Tides Falling Fortunes	**$26.3B**	$11.9B	$7.6B	$1.2B	$0.1B	$5.0B	$0.5B
				Clean and Green	**$60.3B**	$30.4B	$18.6B	$1.7B	($0.2B)	$9.2B	$0.5B
				Back to the Future	**$73.2B**	$47.8B	$17.7B	$1.6B	$0.1B	$5.2B	$0.8B
	3000	67	Regional Express Lanes (MTC + VTA + ACTC + US-101)	Rising Tides Falling Fortunes	**$6.6B**	$6.4B	($0.5B)	$1.4B	($0.2B)	($0.2B)	($0.3B)
				Clean and Green	**$7.0B**	$5.0B	$0.7B	$1.2B	$0.0B	($0.1B)	$0.3B
				Back to the Future	**$18.8B**	$21.8B	$0.7B	$0.8B	($0.5B)	($0.9B)	($3.2B)
	1005	68	Mid-Bay Bridge (I-238 to I-380) (Crossing 2)	Rising Tides Falling Fortunes	**$4.3B**	$4.3B	$0.2B	$0.3B	($0.1B)	($0.2B)	($0.3B)
				Clean and Green	**$7.9B**	$7.1B	$1.3B	($0.2B)	($0.1B)	($0.1B)	($0.2B)
				Back to the Future	**$21.1B**	$21.3B	$1.6B	($0.3B)	$0.0B	($1.4B)	($0.2B)
	1006	69	San Mateo Bridge Reconstruction and Widening (Crossing 1)	Rising Tides Falling Fortunes	**$0.1B**	($0.1B)	$0.1B	$0.0B	$0.0B	$0.1B	$0.0B
				Clean and Green	**($0.8B)**	($1.1B)	$0.3B	$0.2B	$0.0B	($0.1B)	$0.0B
				Back to the Future	**$2.4B**	$2.4B	$0.6B	$0.1B	$0.0B	($0.6B)	($0.1B)
Build Road Capacity - Low Cost	3101	70	I-680/SR-4 Interchange Improvements (Direct/HOV Connectors, Ramp Widening, Auxiliary Lanes)	Rising Tides Falling Fortunes	**($0.1B)**	$0.1B	$0.1B	($0.1B)	$0.0B	($0.1B)	$0.0B
				Clean and Green	**$1.0B**	$0.8B	$0.1B	$0.0B	$0.0B	$0.0B	$0.1B
				Back to the Future	**$1.4B**	$1.2B	$0.0B	$0.2B	$0.0B	$0.0B	$0.0B
	3110	71	Union City-Fremont East-West Connector	Rising Tides Falling Fortunes	**$0.3B**	$0.1B	$0.1B	$0.1B	$0.0B	$0.0B	$0.1B
				Clean and Green	**$0.5B**	$0.2B	$0.1B	$0.2B	$0.0B	$0.0B	$0.0B
				Back to the Future	**$1.2B**	$1.1B	$0.2B	($0.1B)	$0.0B	$0.0B	$0.0B
	3102	72	SR-4 Operational Improvements	Rising Tides Falling Fortunes	**$0.0B**	$0.1B	($0.1B)	($0.1B)	$0.0B	$0.0B	$0.1B
				Clean and Green	**$0.5B**	$0.0B	$0.2B	$0.1B	$0.0B	$0.0B	$0.2B
				Back to the Future	**$1.1B**	$0.8B	($0.2B)	$0.2B	$0.0B	$0.1B	$0.1B
	3104	73	I-80/I-680/SR-12 Interchange + Widening (Phases 2B-7)	Rising Tides Falling Fortunes	**$0.3B**	$0.1B	$0.0B	$0.0B	$0.0B	$0.0B	$0.2B
				Clean and Green	**$0.9B**	$0.3B	$0.4B	$0.0B	$0.0B	$0.0B	$0.2B
				Back to the Future	**$0.7B**	$0.3B	($0.2B)	$0.3B	$0.0B	$0.1B	$0.2B
	3103	74	SR-4 Widening (Brentwood to Discovery Bay)	Rising Tides Falling Fortunes	**($0.3B)**	$0.1B	$0.0B	($0.4B)	$0.0B	$0.1B	$0.1B
				Clean and Green	**$0.1B**	$0.2B	($0.2B)	$0.2B	$0.0B	($0.1B)	$0.0B
				Back to the Future	**$2.5B**	$1.5B	$0.6B	$0.3B	$0.0B	$0.1B	$0.1B
	3106	75	SR-152 Realignment and Tolling	Rising Tides Falling Fortunes	**$4.5B**	$4.1B	$0.0B	$0.2B	$0.0B	$0.0B	$0.2B

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Build Road Capacity - Low Cost	3106	75	SR-152 Realignment and Tolling	Clean and Green	**$0.1B**	$3.3B	$0.9B	($2.5B)	($0.4B)	($0.2B)	($0.9B)
				Back to the Future	**($0.9B)**	$4.9B	($0.6B)	($1.8B)	($0.6B)	$0.0B	($2.7B)
	3109	76	SR-262 Widening and Interchange Improvements	Rising Tides Falling Fortunes	**$0.2B**	$0.2B	($0.2B)	($0.4B)	$0.0B	$0.2B	$0.4B
				Clean and Green	**$0.4B**	$0.4B	$0.0B	($0.1B)	$0.0B	($0.1B)	$0.1B
				Back to the Future	**$1.2B**	$1.4B	$0.4B	($0.8B)	$0.0B	$0.0B	$0.1B
	3100	77	SR-239 Widening (Brentwood to Tracy including Airport Connector)	Rising Tides Falling Fortunes	**$0.7B**	$0.6B	$0.0B	$0.2B	($0.1B)	$0.0B	$0.1B
				Clean and Green	**$1.0B**	$0.8B	$0.4B	($0.2B)	($0.1B)	$0.1B	$0.1B
				Back to the Future	**$2.3B**	$2.3B	$0.0B	$0.0B	($0.1B)	$0.1B	$0.0B
	3105	78	SR-12 Widening (I-80 to Rio Vista)	Rising Tides Falling Fortunes	**$0.2B**	$0.1B	$0.0B	$0.2B	$0.0B	$0.0B	$0.0B
				Clean and Green	**$0.7B**	$0.5B	$0.0B	$0.1B	$0.0B	$0.1B	$0.1B
				Back to the Future	**$1.8B**	$1.6B	($0.4B)	$0.5B	$0.0B	$0.0B	$0.1B
Optimize Existing Freeway Network	5000	79	Bay Area Forward (Phase 1: Freeway Ramp and Arterial Components Only)	Rising Tides Falling Fortunes	**$4.3B**	$3.8B	$0.1B	$1.2B	($0.1B)	$0.0B	($0.7B)
				Clean and Green	**$5.4B**	$5.3B	$0.6B	$0.2B	($0.1B)	($0.2B)	($0.4B)
				Back to the Future	**$3.5B**	$5.9B	$1.1B	$1.5B	($0.5B)	($0.6B)	($3.9B)
	6103	80	Demand-Based Tolling on All Highways with Means-Based Tolls	Rising Tides Falling Fortunes	**$16.5B**	$15.1B	($1.2B)	$9.1B	$0.1B	$0.2B	($7.0B)
				Clean and Green	**$6.1B**	$4.2B	($2.1B)	$5.0B	$0.4B	$0.2B	($1.5B)
				Back to the Future	**$68.2B**	($5.6B)	($10.1B)	$72.5B	$1.8B	$6.0B	$3.5B
	6102	81	HOV Lane Network with per-mile fee for SOVs	Rising Tides Falling Fortunes	**$13.5B**	$14.3B	($1.3B)	$8.4B	$1.5B	$2.1B	($11.5B)
				Clean and Green	**($4.3B)**	($1.7B)	($2.9B)	$1.2B	($0.1B)	$1.6B	($2.4B)
				Back to the Future	**$41.7B**	$23.0B	($7.4B)	$25.5B	$0.8B	$3.5B	($3.7B)
	3003	82	San Francisco Arterial HOV and Freeway HOT Lanes	Rising Tides Falling Fortunes	**$0.7B**	$0.8B	$0.2B	($0.1B)	$0.0B	($0.1B)	$0.0B
				Clean and Green	**$1.1B**	$0.8B	$0.5B	($0.1B)	$0.0B	($0.1B)	$0.1B
				Back to the Future	**$3.2B**	$2.5B	$0.8B	$0.0B	$0.0B	($0.1B)	$0.1B
	2002	83	AC Transit Transbay Network: Capital Improvements + Service Increase	Rising Tides Falling Fortunes	**$3.2B**	$0.8B	$1.3B	$0.5B	$0.0B	$0.2B	$0.3B
				Clean and Green	**$4.9B**	$0.7B	$2.8B	$1.0B	$0.1B	$0.2B	$0.2B
				Back to the Future	**$6.2B**	$2.7B	$2.6B	$0.5B	$0.0B	$0.1B	$0.3B
	6022	84	Bus Rapid Transit (BRT) on All Bridges: Dedicated Lanes + Service/Capacity Improvements	Rising Tides Falling Fortunes	**$0.7B**	($0.6B)	$0.6B	($0.4B)	$0.1B	$0.4B	$0.6B
				Clean and Green	**$1.3B**	($1.6B)	$2.0B	$0.1B	$0.2B	$0.2B	$0.3B
				Back to the Future	**($15.0B)**	($15.0B)	($0.2B)	($0.4B)	($0.2B)	$0.7B	$0.0B
	6020	85	Regional Express (ReX) Bus Network + Optimized Express Lane Network	Rising Tides Falling Fortunes	**$11.8B**	$8.6B	$2.6B	$0.8B	$0.1B	$0.3B	($0.6B)
				Clean and Green	**$27.8B**	$10.2B	$12.7B	$3.7B	$0.2B	$0.9B	$0.2B

Methodology Overview: All project impacts are measured against a uniform base transportation and land use network in each future, except Resilience projects, which are measured against a baseline where that asset is out of service (hence n/a in some futures).
Inter-regional projects: Modeled Bay Area benefits have been multiplied by a factor to reflect the ratio of expected ridership from outside the region. Valley Link/ACE Rail benefit multiplier: 3.3; Caltrain/HSR benefit multiplier: 1.3 (the HSR multiplier is applied in Clean and Green only, the Future where HSR is completely built out).
Description of benefits:
Accessibility Benefits: Represents change in accessibility benefits to all Bay Area residents as a result of the project.
Transit Crowding Benefits: Captures the (dis)benefits associated with increase/decrease in crowding, since people may change their travel choices or be denied boarding, or experience discomfort in a crowded vehicle.
Freeway Reliability and Vehicle Ownership Benefits: Reflects change in non-recurring vehicle delay on freeways, and the costs of change in vehicle ownership as a result of the project.
Environmental Benefits: Captures monetary value of change in GHG emissions or impact on natural lands (wetlands, pastureland, farmland) due to the project.
Health Benefits: Represents benefits from increased physical activity due to more walking/biking and reduction in air pollutants and noise.
Safety Benefits: Captures decrease in injuries and collisions due to reduced VMT as well as operational and safety improvements such as freewayramp redesign or grade separations.
Note: Societal transfers such as fare/toll revenue (or loss) are excluded from both benefits and costs, following standard practice for societal benefit-cost analyses. For Project IDs 6111 and 6112, benefit values include benefits from a suite of transit capacity expansion projects; however, only the incremental benefits of the project are used for the calculation of the Benefit-Cost Ratio in Attachment A.
(Full methodology can be found here: https://mtc.ca.gov/sites/default/files/ProjectPerformance_Methodology.pdf)

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

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

All values in billions of 2019 dollars discounted present value

Project Type	Project ID	Row ID	Project	Future	Grand Total	Accessibility Benefits	Transit Crowding Benefits	Freeway Reliability and Vehicle Ownership Benefits	Environmental Benefits	Health Benefits	Safety Benefits
Optimize Existing Freeway Network	6020	85	Regional Express (REX) Bus Network + Optimized Express Lane Network	Back to the Future	**$22.2B**	$22.1B	$3.5B	($0.5B)	($0.1B)	$0.0B	($2.9B)
	5003	86	I-680 Corridor Improvements (BRT, Express Bus, Shared AVs, Gondolas)	Rising Tides Falling Fortunes	**$1.2B**	$0.7B	($0.3B)	$0.4B	$0.0B	$0.2B	$0.1B
				Clean and Green	**$2.1B**	$1.1B	($0.5B)	$1.2B	$0.0B	$0.2B	$0.1B
				Back to the Future	**$2.8B**	$1.6B	$0.8B	$0.5B	$0.0B	$0.1B	$0.0B
	6104	87	Reversible Lanes on Top 10 Congested Bridges and Freeways	Rising Tides Falling Fortunes	**$0.4B**	$0.5B	$0.3B	($0.4B)	$0.0B	$0.0B	$0.0B
				Clean and Green	**$0.1B**	$0.5B	($0.2B)	($0.2B)	$0.0B	$0.0B	$0.0B
				Back to the Future	**($0.7B)**	($1.0B)	($0.3B)	$0.1B	$0.0B	$0.2B	$0.2B
	6003	88	I-80 Corridor Overhaul with Per-Mile Tolling	Rising Tides Falling Fortunes	**($2.1B)**	($1.9B)	($0.8B)	$0.6B	$0.3B	$0.1B	($0.4B)
				Clean and Green	**($3.1B)**	($2.4B)	($1.5B)	$0.5B	$0.4B	$0.1B	($0.1B)
				Back to the Future	**($6.5B)**	($3.6B)	($3.5B)	$0.7B	$0.2B	$0.1B	($0.3B)
	6021	89	Bus Rapid Transit (BRT) on All Bridges: Dedicated Lanes only	Rising Tides Falling Fortunes	**($2.5B)**	($1.5B)	($0.7B)	($1.1B)	$0.1B	$0.4B	$0.4B
				Clean and Green	**($2.8B)**	($2.4B)	($0.6B)	($0.4B)	$0.2B	$0.1B	$0.3B
				Back to the Future	**($21.1B)**	($18.4B)	($1.7B)	($1.3B)	($0.2B)	$0.7B	($0.2B)
Resilience	7002	91	I-580/US-101/SMART Marin Resilience Project	Rising Tides Falling Fortunes	**$12.0B**	$11.6B	$1.2B	$0.2B	($0.2B)	($0.5B)	($0.2B)
				Clean and Green	**$17.7B**	$17.1B	$1.6B	$0.0B	($0.3B)	($0.4B)	($0.3B)
				Back to the Future	**$20.0B**	$21.0B	$1.6B	($1.7B)	$0.0B	($0.8B)	$0.0B
	7005	92	SR-237 Resilience Project (Alviso)	Rising Tides Falling Fortunes	**$2.2B**	$1.9B	$0.0B	$0.3B	$0.0B	($0.1B)	$0.2B
				Back to the Future	**$11.1B**	$11.8B	$1.9B	($1.7B)	($0.1B)	($0.7B)	($0.1B)
	7006	93	I-880 Resilience Project (South Fremont)	Rising Tides Falling Fortunes	**$4.0B**	$2.9B	$0.1B	$1.1B	($0.1B)	($0.1B)	$0.3B
	7004	94	SR-84 Resilience Project (Dumbarton Bridge, 101 In..	Rising Tides Falling Fortunes	**$4.7B**	$4.8B	$0.4B	$0.6B	($0.1B)	($0.3B)	($0.6B)
	7003	95	US-101 Peninsula Resilience Project (San Antonio R..	Rising Tides Falling Fortunes	**$2.7B**	$2.8B	$0.6B	$0.1B	($0.1B)	($0.3B)	($0.4B)
	7001	96	VTA LRT Resilience Project (Tasman West)	Rising Tides Falling Fortunes	**$1.0B**	$0.3B	$0.2B	$0.5B	$0.0B	$0.1B	$0.0B
				Clean and Green	**$1.1B**	$0.7B	($0.4B)	$0.3B	$0.0B	$0.3B	$0.1B
				Back to the Future	**$1.6B**	$1.6B	($1.2B)	$0.8B	$0.0B	$0.3B	$0.1B
	3200	97	SR-37 Long Term Project (Tolling, Elevation, Interchanges, Widening, Express Bus)	Rising Tides Falling Fortunes	**$12.4B**	$2.1B	$0.7B	$0.3B	$9.2B	($0.2B)	$0.2B
				Clean and Green	**$11.3B**	$4.1B	$1.0B	($2.0B)	$9.1B	($0.3B)	($0.7B)
				Back to the Future	**$4.1B**	($1.4B)	($0.1B)	($1.2B)	$9.2B	($0.3B)	($2.1B)

Methodology Overview: All project impacts are measured against a uniform base transportation and land use network in each future, except Resilience projects, which are measured against a baseline where that asset is out of service (hence n/a in some futures).
Inter-regional projects: Modeled Bay Area benefits have been multiplied by a factor to reflect the ratio of expected ridership from outside the region. Valley Link/ACE Rail benefit multiplier: 3.3; Caltrain/HSR benefit multiplier: 1.3 (the HSR multiplier is applied in Clean and Green only, the Future where HSR is completely built out).
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Environmental Benefits: Captures monetary value of change in GHG emissions or impact on natural lands (wetlands, pastureland, farmland) due to the project.
Health Benefits: Represents benefits from increased physical activity due to more walking/biking and reduction in air pollutants and noise.
Safety Benefits: Captures decrease in injuries and collisions due to reduced VMT as well as operational and safety improvements such as freewayramp redesign or grade separations.
Note: Societal transfers such as fare/toll revenue (or loss) are excluded from both benefits and costs, following standard practice for societal benefit-cost analyses. For Project IDs 6111 and 6112, benefit values include benefits from a suite of transit capacity expansion projects; however, only the incremental benefits of the project are used for the calculation of the Benefit-Cost Ratio in Attachment A.
(Full methodology can be found here: https://mtc.ca.gov/sites/default/files/ProjectPerformance_Methodology.pdf)

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

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

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

						Lifecycle Costs (billions of discounted present value 2019 dollars)				**Project Costs (2019$B) (as reviewed with sponsor)**	
Project Type	Project ID	Row ID	Project	Project Source	Total Lifecycle Cost (billions of discounted present value 2019$)	Initial Capital Cost	O&M	Rehab + Replacement	Residual Value	Initial Capital Cost	Annual O&M
Build Core Rail	1004	1	New San Francisco-Oakland Transbay Rail Crossing - Commuter Rail (Crossing 5)	Crossings Study	$46.1B	$39.2B	$7.4B	$4.2B	($4.7B)	$45.9B	$0.4B
	1007	2	New San Francisco-Oakland Transbay Rail Crossing - BART + Commuter Rail (Crossing 7)	Crossings Study	$83.5B	$74.1B	$12.4B	$6.9B	($9.8B)	$86.8B	$0.7B
	1002	3	New San Francisco-Oakland Transbay Rail Crossing - BART (Crossing 3: Mission St)	Crossings Study	$36.2B	$33.8B	$4.8B	$2.6B	($5.0B)	$39.6B	$0.3B
	1003	4	New San Francisco-Oakland Transbay Rail Crossing - BART (Crossing 4: New Markets)	Crossings Study	$37.4B	$34.9B	$4.9B	$2.7B	($5.1B)	$40.9B	$0.3B
	2300	5	Caltrain Downtown Extension	TJPA	$4.8B	$4.4B	$0.7B	$0.1B	($0.5B)	$4.9B	$0.0B
	2205	6	BART to Silicon Valley (Phase 2)	VTA	$6.0B	$4.7B	$1.3B	$0.5B	($0.5B)	$5.2B	$0.1B
	2306	7	Dumbarton Rail (Redwood City to Union City)	SamTrans + CCAG	$3.9B	$2.7B	$1.1B	$0.4B	($0.3B)	$3.0B	$0.1B
	2310	8	Megaregional Rail Network + Resilience Project (Caltrain, ACE, Valley Link, Dumbarton, Cap Cor)	City of San Jose	$54.1B	$47.0B	$9.9B	$2.4B	($5.1B)	$55.9B	$0.6B
	2208	9	BART Gap Closure (Millbrae to Silicon Valley)	VTA	$40.4B	$43.2B	$1.1B	$2.2B	($6.0B)	$50.7B	$0.1B
	6002	10	SMART to Richmond via New Richmond-San Rafael Bridge	Public/NGO Submission	$5.0B	$5.4B	$0.1B	$0.1B	($0.7B)	$6.4B	$0.0B
Extend Rail Network - High Cost	2308	11	Valley Link (Dublin to San Joaquin Valley)	TVSJVRRA	$3.0B	$2.0B	$0.7B	$0.5B	($0.2B)	$2.2B	$0.0B
	2309	12	Altamont Corridor Vision Phase 1 (to San Joaquin Valley)	TVSJVRRA, SJRRC	$4.6B	$3.3B	$1.0B	$0.7B	($0.2B)	$3.5B	$0.0B
	2206	13	BART Extension from Diridon to Cupertino	VTA	$12.1B	$11.1B	$1.5B	$0.9B	($1.5B)	$13.0B	$0.1B
	2207	14	BART Extension from Diridon to Gilroy (replacing existing Caltrain)	VTA	$17.7B	$14.2B	$2.9B	$2.3B	($1.7B)	$16.6B	$0.2B
	2204	15	BART on I-680 (Walnut Creek to West Dublin/Pleasanton)	Caltrans	$11.0B	$9.4B	$0.9B	$1.4B	($0.7B)	$10.2B	$0.0B
	2203	16	BART to Hercules & I-80 Bus from Vallejo to Oakland	CCTA	$5.8B	$4.1B	$0.5B	$1.5B	($0.3B)	$4.5B	$0.0B
Extend Rail Network - Low Cost	2312	17	ACE Rail Service Increase (10 Daily Roundtrips)	SJRRC	$1.3B	$0.8B	$0.5B	$0.1B	($0.1B)	$0.9B	$0.0B
	2202	18	BART DMU Extension to Brentwood	CCTA	$0.6B	$0.4B	$0.1B	$0.1B	$0.0B	$0.4B	$0.0B
	2305	19	SMART to Solano (Novato to Suisun City, without sea level rise protections)	SMART	$1.6B	$1.1B	$0.2B	$0.4B	($0.1B)	$1.2B	$0.0B
	2304	20	SMART Extension to Cloverdale	SMART	$0.5B	$0.3B	$0.1B	$0.1B	$0.0B	$0.4B	$0.0B
Optimize Existing Transit Network - High Cost	2201	21	BART Core Capacity	BART	$4.5B	$2.8B	$1.2B	$0.8B	($0.4B)	$3.2B	$0.1B
	2001	22	AC Transit Local Rapid Network: Capital Improvements + Service Increase	AC Transit	$6.4B	$2.5B	$2.4B	$1.6B	($0.1B)	$2.6B	$0.1B
	2303	23	Caltrain Full Electrification and Blended System: High Growth	VTA, City of San Jose	$31.3B	$26.5B	$6.3B	$1.1B	($2.5B)	$30.6B	$0.3B
	2302	24	Caltrain Full Electrification and Blended System: Moderate Growth	Caltrain + HSR	$24.6B	$21.8B	$4.4B	$0.8B	($2.3B)	$25.9B	$0.2B
	2005	25	Alameda County BRT Network + Connected Vehicle Corridors	ACTC	$4.0B	$1.1B	$2.2B	$0.7B	($0.1B)	$1.2B	$0.1B
	2410	26	VTA LRT Systemwide Grade Separation and Full Automation	City of San Jose	$14.8B	$15.4B	$0.2B	$0.8B	($1.6B)	$17.3B	$0.0B
	2409	27	VTA LRT Systemwide Grade Separation	VTA	$11.6B	$12.2B	$0.2B	$0.7B	($1.5B)	$14.2B	$0.0B
	2401	28	North San Jose LRT Subway	VTA	$4.9B	$5.3B	$0.1B	$0.1B	($0.7B)	$5.8B	$0.0B
	2411	29	VTA LRT Systemwide Grade Separation, Network Expansion, and Full Automation	VTA, City of San Jose	$44.2B	$44.1B	$2.1B	$2.9B	($4.9B)	$49.6B	$0.1B
	2407	30	Muni Metro Southwest M-Line Subway	SFCTA	$5.6B	$3.7B	$2.2B	$0.2B	($0.5B)	$4.1B	$0.1B
	2301	31	Caltrain Full Electrification and Blended System: Base Growth	Caltrain + HSR	$20.9B	$19.0B	$3.4B	$0.5B	($2.1B)	$22.6B	$0.2B
Optimize Existing Transit Network - Low Cost	3001	32	Treasure Island Congestion Pricing	SF	$0.8B	$0.1B	$0.6B	$0.1B	$0.0B	$0.1B	$0.0B
	6111	33	Integrated Transit Fare System (with Transit Capacity Expansion)	Public/NGO Submission	$0.3B	$0.2B	$0.0B	$0.1B	$0.0B	$0.2B	$0.0B
	6112	34	Integrated Transit Fare System and Seamless Transfers (with Transit Capacity Expansion)	Public/NGO Submission	$0.5B	$0.3B	$0.0B	$0.1B	$0.0B	$0.4B	$0.0B

Lifecycle Costs (calculated using discounted present value methodology):
Initial Capital Cost: Capital cost of constructing/implementing the project.
O&M: Annual operating and maintenance costs of the project over the full analysis period.
Rehab + Replacement: Rehabiliation costs of pavement and roadway structures; replacement costs of roadway and transit assets after their useful lives.
(e.g. bus replacement every 14 years, roadway technology every 20 years)
Residual Value: Represents useful value of assets/infrastucture at the end of the analysis period (based on straight line depreciation).
Project Costs (as reviewed with sponsor):
Reflects sponsor submitted costs of projects. These were revised in some cases when a high-level cost review of all projects using an independent cost consultant.
and a uniform methodology flagged sponsor costs that may have been underestimated (such cases were discussed with the sponsors individually).
Note: Societal transfers such as fare/toll revenue (or loss) are excluded from both benefits and costs, following standard practice for societal benefit-cost analyses.
(Full methodology can be found here: https://mtc.ca.gov/sites/default/files/ProjectPerformance_Methodology.pdf)

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

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

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

						Lifecycle Costs (billions of discounted present value 2019 dollars)				Project Costs (2019$B) (as reviewed with sponsor)	
Project Type	Project ID	Row ID	Project	Project Source	Total Lifecycle Cost (billions of discounted present value 2019$)	Initial Capital Cost	O&M	Rehab + Replacement	Residual Value	Initial Capital Cost	Annual O&M
Optimize Existing Transit Network - Low Cost	2209	35	Irvington BART Infill Station	ACTC	$0.2B	$0.1B	$0.1B	$0.0B	$0.0B	$0.1B	$0.0B
	3002	36	Downtown San Francisco Congestion Pricing	SF	$0.3B	$0.0B	$0.3B	$0.0B	$0.0B	$0.1B	$0.0B
	2007	37	San Francisco Southeast Waterfront Transit Improvements	SF	$0.6B	$0.2B	$0.3B	$0.1B	$0.0B	$0.2B	$0.0B
	2100	38	San Pablo BRT	AC Transit	$0.5B	$0.3B	$0.0B	$0.2B	$0.0B	$0.3B	$0.0B
	2008	39	Alameda Point Transit Network Improvements	ACTC	$0.5B	$0.1B	$0.4B	$0.0B	$0.0B	$0.1B	$0.0B
	2000	40	AC Transit Local Network: Service Increase	AC Transit	$2.6B	$0.2B	$2.2B	$0.2B	$0.0B	$0.2B	$0.1B
	2101	41	Geary BRT (Phase 2)	SF	$0.6B	$0.2B	$0.3B	$0.2B	$0.0B	$0.2B	$0.0B
	2105	42	Alameda County E14th St/Mission and Fremont Blvd Multimodal Corridor	ACTC	$0.5B	$0.3B	$0.0B	$0.2B	$0.0B	$0.3B	$0.0B
	2103	43	SamTrans El Camino Real BRT: Capital and Service Improvements	CCAG	$0.6B	$0.2B	$0.3B	$0.1B	$0.0B	$0.2B	$0.0B
	2003	44	Muni Forward: Capital Improvements + Service Increase	SF	$2.9B	$0.4B	$2.1B	$0.4B	$0.0B	$0.5B	$0.1B
	6100	45	Integrated Transit Fare System	Public/NGO Submission	$0.3B	$0.2B	$0.1B	$0.1B	$0.0B	$0.2B	$0.0B
	2004	46	Sonoma Countywide Bus: Service Increase	SCTA	$0.9B	$0.3B	$0.4B	$0.3B	$0.0B	$0.3B	$0.0B
	2400	47	Downtown San Jose LRT Subway	VTA	$1.9B	$2.2B	($0.1B)	$0.1B	($0.3B)	$2.4B	$0.0B
	6106	48	Free Transit for Low-Income Households	Public/NGO Submission	$0.1B	$0.0B	$0.1B	$0.0B	$0.0B	$0.1B	$0.0B
	6101	49	Free Transit for All	Public/NGO Submission	$0.1B	$0.0B	$0.1B	$0.0B	$0.0B	$0.1B	$0.0B
Build Local Transit	4000	50	Oakland/Alameda Gondola Network	City of Oakland	$1.1B	$0.7B	$0.2B	$0.3B	$0.0B	$0.7B	$0.0B
	4001	51	Mountain View AV Network (Free Fare, Subsidies from Companies)	City of Mountain View	$1.4B	$1.3B	$0.2B	$0.0B	($0.1B)	$1.4B	$0.0B
	2403	52	Vasona LRT Extension (Phase 2)	VTA	$0.3B	$0.2B	$0.0B	$0.0B	$0.0B	$0.2B	$0.0B
	2412	53	SR-85 LRT (Mountain View to US101 interchange)	City of Cupertino	$3.7B	$2.6B	$0.5B	$0.8B	($0.2B)	$2.9B	$0.0B
	2408	54	Muni Metro T-Third Extension to South San Francisco	City of South San Francisco	$1.8B	$1.1B	$0.4B	$0.3B	($0.1B)	$1.2B	$0.0B
	4002	55	Contra Costa Autonomous Shuttle Program	CCTA	$3.4B	$1.3B	$0.9B	$1.2B	($0.1B)	$1.4B	$0.0B
	4003	56	Cupertino-Mountain View-San Jose Elevated Maglev Rail Loop	City of Cupertino	$8.1B	$7.2B	$0.3B	$1.1B	($0.6B)	$7.9B	$0.0B
	2402	57	San Jose Airport People Mover	VTA	$1.4B	$1.1B	$0.2B	$0.2B	($0.1B)	$1.2B	$0.0B
Enhance Alternate Modes	2600	58	WETA Ferry Service Frequency Increase	WETA	$0.4B	$0.0B	$0.3B	$0.0B	$0.0B	$0.0B	$0.0B
	6006	59	Enhanced Regionwide Bike Infrastructure	MTC/ABAG	$12.6B	$7.4B	$0.8B	$4.8B	($0.4B)	$8.3B	$0.0B
	2602	60	WETA Ferry Service: Berkeley - San Francisco	WETA	$0.2B	$0.0B	$0.2B	$0.0B	$0.0B	$0.1B	$0.0B
	2700	61	Bay Bridge West Span Bike Path	MTC/ABAG	$0.8B	$0.5B	$0.1B	$0.3B	$0.0B	$0.5B	$0.0B
	2603	62	WETA Ferry Service: Redwood City - San Francisco - Oakland	WETA	$0.3B	$0.1B	$0.3B	$0.0B	$0.0B	$0.1B	$0.0B
	4004	63	Regional Hovercraft Network	CCAG	$2.6B	$0.8B	$1.7B	$0.2B	$0.0B	$0.9B	$0.1B
	6004	64	Bay Trail Completion	Public/NGO Submission	n/a						
	6005	65	Regional Bicycle Superhighway Network	Public/NGO Submission	n/a						
Build Road Capacity - High Cost	1001	66	Southern Crossing Bridge + New San Francisco-Oakland Transbay Rail Crossing - BART (Crossing 6)	Crossings Study	$47.1B	$45.0B	$5.7B	$3.0B	($6.5B)	$52.7B	$0.3B
	3000	67	Regional Express Lanes (MTC + VTA + ACTC + US-101)	MTC/ABAG	$12.1B	$5.6B	$3.7B	$3.1B	($0.2B)	$6.1B	$0.2B
	1005	68	Mid-Bay Bridge (I-238 to I-380) (Crossing 2)	Crossings Study	$19.9B	$14.8B	$0.8B	$5.6B	($1.3B)	$17.4B	$0.0B

Lifecycle Costs (calculated using discounted present value methodology):
Initial Capital Cost: Capital cost of constructing/implementing the project.
O&M: Annual operating and maintenance costs of the project over the full analysis period.
Rehab + Replacement: Rehabiliation costs of pavement and roadway structures; replacement costs of roadway and transit assets after their useful lives.
(e.g. bus replacement every 14 years, roadway technology every 20 years)
Residual Value: Represents useful value of assets/infrastucture at the end of the analysis period (based on straight line depreciation).
Project Costs (as reviewed with sponsor):
Reflects sponsor submitted costs of projects. These were revised in some cases when a high-level cost review of all projects using an independent cost consultant.
and a uniform methodology flagged sponsor costs that may have been underestimated (such cases were discussed with the sponsors individually).
Note: Societal transfers such as fare/toll revenue (or loss) are excluded from both benefits and costs, following standard practice for societal benefit-cost analyses.
(Full methodology can be found here: https://mtc.ca.gov/sites/default/files/ProjectPerformance_Methodology.pdf)

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

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

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

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

Lifecycle Costs (calculated using discounted present value methodology):
Initial Capital Cost: Capital cost of constructing/implementing the project.
O&M: Annual operating and maintenance costs of the project over the full analysis period.
Rehab + Replacement: Rehabiliation costs of pavement and roadway structures; replacement costs of roadway and transit assets after their useful lives.
(e.g. bus replacement every 14 years, roadway technology every 20 years)
Residual Value: Represents useful value of assets/infrastucture at the end of the analysis period (based on straight line depreciation).
Project Costs (as reviewed with sponsor):
Reflects sponsor submitted costs of projects. These were revised in some cases when a high-level cost review of all projects using an independent cost consultant. and a uniform methodology flagged sponsor costs that may have been underestimated (such cases were discussed with the sponsors individually).
Note: Societal transfers such as fare/toll revenue (or loss) are excluded from both benefits and costs, following standard practice for societal benefit-cost analyses.
(Full methodology can be found here: https://mtc.ca.gov/sites/default/files/ProjectPerformance_Methodology.pdf)

Horizon/Plan Bay Area 2050: Final Project Performance Findings

Attachment F: Confidence Assessment

The Confidence Assessment highlights potential limitations of the benefit-cost assessment. Since the last Project Performance Assessment in Plan Bay Area 2040, various improvements to the methodology have addressed limitations that were identified then. These are briefed below; further details can be found in the Project Performance Methodology.

Transit Crowding. The benefit of transit crowding relief measures is calculated using an off-model methodology that is based on a 'crowding penalty factor'. This factor is a multiplier of in-vehicle travel time, based on the load factor at a transit link level and the seated vehicle capacity. The multipliers were aligned with those used by peer agencies in Toronto, London and Los Angeles.

Safety. Incremental to the Plan Bay Area 2040 approach that is based on vehicle miles traveled, benefits of specific operational improvements that were not previously captured, such as interchange or street design improvements, were estimated using crash reduction factors compiled by FHWA. Benefits of collision reduction from grade separations was also captured through this methodology.

Impact on Natural Lands. Conversion of natural lands (e.g. wetlands, agricultural land) to infrastructure was estimated as an annual loss of goods, such as farm products and wood, and services, such as climate regulation and habitat provision, based on a per-acre value.

Lifecycle Benefits and Costs. Present values of a stream of benefits and costs were used to calculate a benefit-cost ratio, rather than using benefits and costs in the horizon year as in Plan Bay Area 2040. This approach captures advantages of quicker construction and implementation timelines, and long-term benefits of large investments.

Varied Land Use Patterns. While the impact of a transportation project on land use is not fully captured on a project level, each project was evaluated against three different "Futures" and associated land use patterns (discussed further below). This evaluation lends insight into performance and resiliency of projects under different land use scenarios.

The Confidence Assessment below describes limitations that arise from accuracy of the modeling or deficiencies in the benefit-cost framework. Disclosure of these limitations is intended to provide transparency and capture concerns that have been raised by stakeholders during the course of the assessment. The first section of the document describes overarching confidence considerations that extend over all projects or some project types. The second section of the document describes limitations specific to each project.

Overarching Confidence Considerations

External Forces. Each project is evaluated against three different "Futures". Such evaluation lends insight into performance and resiliency of projects under different future conditions that may be driven by external forces. *Rising Tides Falling Fortunes* is a low-growth future with a cost of driving similar to today and autonomous vehicle and electric vehicle market

penetration not very far from today's levels. *Clean and Green* and *Back to the Future* are both high-growth futures, the former generally being a more transit-supportive future with a high cost of driving, denser urban land use patterns and dispersed job centers, and the latter being a more auto-supportive future with a low cost of driving, dispersed housing patterns and urban job centers. In both these Futures, autonomous vehicle and electric vehicle technologies have significantly evolved. All three Futures were purposefully framed as divergent futures through a collaborative process with stakeholders. More information regarding the Futures can be found on our website. While the assessment intends to capture the resiliency of projects to such divergent futures, it acknowledges that projects may perform differently (better or worse) under various other future conditions.

Land Use Pattern. Each Future is associated with its own land use pattern, and so projects are evaluated against three different land use patterns. While the three land use patterns are divergent, growth in all the Futures is based primarily on the Priority Development Area (PDA) framework from Plan Bay Area 2040. Further information on PDAs can be found on our website. Consequently, this assessment assumes significant growth in jurisdictions that have nominated themselves as PDAs, for example, along transit corridors. By using the Plan Bay Area 2040 land use, the assessment also has a significant tie to the land use objectives of the last Plan, which may evolve in Plan Bay Area 2050.

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

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

Unconstrained Transit Capacity. Travel Model 1.5 does not constrain transit capacity, and hence ridership on transit is a representation of unconstrained demand on that transit. While this may lead to overestimation of benefits for transit projects, the impact is mitigated by the off-model transit crowding calculation, which would result in crowding disbenefits for the

project. Similarly, Travel Model 1.5 also does not constrain parking capacity at park-and-ride stations. Again, this may lead to overestimation of benefits for projects with park-and-ride facilities such as BART and commuter rail; however, the impact would be mitigated by the off-model transit crowding disbenefits.

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

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

Note on Land Values and Other Economic Benefits: While economic benefits such as land values and job conglomeration can be significant, especially in the case of rail projects and in urban downtown locations, such benefits are not within the scope of societal benefit-cost analyses. Estimating such benefits would necessitate a separate economic benefit-cost analysis. Given the difficult nature of such analysis, it is usually conducted to compare alternatives of a single project.

Project-Specific Confidence Considerations

An evaluation of circumstances unique to each project is included in the table on the following pages. The two criteria utilized for this assessment are listed below:

1. Travel Model Accuracy
    - Does the travel model have limitations in understanding a particular type of travel behavior (e.g. weaving)?
    - Does the travel model have limitations in understanding travel patterns due to the nature or location of the project (e.g. new mode such as gondola, projects at periphery of the region)?
    - Does the travel model lack an understanding of smaller-scale project travel changes relative to the region (e.g. single infill station)?
2. Framework Completeness
    - Does the travel model output capture all of the primary benefits of the project (e.g. transit reliability, or redundancy)?

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

This section of the Confidence Assessment comments on limitations of project performance evaluation across two criteria: Travel Model Accuracy and Framework Completeness. If a criterion is marked X, see comments to the right. Row IDs correspond to Attachment A.

Project Type	Row ID	Project ID	Project	Travel Model Accuracy	Framework Completeness	Comments
Build Core Rail	1	1004	New San Francisco-Oakland Transbay Rail Crossing - Commuter Rail (Crossing 5)		X	The analysis does not capture the benefits of providing redundancy in the San Francisco-Oakland Transbay Corridor.
	2	1007	New San Francisco-Oakland Transbay Rail Crossing - BART + Commuter Rail (Crossing 7)		X	The analysis does not capture the benefits of providing redundancy in the San Francisco-Oakland Transbay Corridor.
	3	1002	New San Francisco-Oakland Transbay Rail Crossing - BART (Crossing 3: Mission St)		X	The analysis does not capture the benefits of providing redundancy in the San Francisco-Oakland Transbay Corridor.
	4	1003	New San Francisco-Oakland Transbay Rail Crossing - BART (Crossing 4: New Markets)		X	The analysis does not capture the benefits of providing redundancy in the San Francisco-Oakland Transbay Corridor.
	5	2300	Caltrain Downtown Extension			-
	6	2205	BART to Silicon Valley (Phase 2)			-
	7	2306	Dumbarton Rail (Redwood City to Union City)		X	The analysis does not capture the benefits of providing redundancy in the Dumbarton Bridge Corridor.
	8	2310	Megaregional Rail Network + Resilience Project (Caltrain, ACE, Valley Link, Dumbarton, Cap Cor)			-
	9	2208	BART Gap Closure (Millbrae to Silicon Valley)			-
	10	6002	SMART to Richmond via New Richmond-San Rafael Bridge			-

This section of the Confidence Assessment comments on limitations of project performance evaluation across two criteria: Travel Model Accuracy and Framework Completeness. If a criterion is marked X, see comments to the right. Row IDs correspond to Attachment A.

Project Type	Row ID	Project ID	Project	Travel Model Accuracy	Framework Completeness	Comments
Extend Rail Network - High Cost	11	2308	Valley Link (Dublin to San Joaquin Valley)	X		The travel model is not able to capture project benefits that may accrue to residents outside the nine-county Bay Area. For this reason, an off-model multiplier of 3.3 was used for all benefits of the project to reflect the ratio of expected ridership from outside the region. However, this might under or over represent benefits since ridership is not an accurate proxy for project benefits, but may be the best readily available proxy.
	12	2309	Altamont Corridor Vision Phase 1 (to San Joaquin Valley)	X		The travel model is not able to capture project benefits that may accrue to residents outside the nine-county Bay Area. For this reason, an off-model multiplier of 3.3 was used for all benefits of the project to reflect the ratio of expected ridership from outside the region. However, this might under or over represent benefits since ridership is not an accurate proxy for project benefits, but may be the best readily available proxy.
	13	2206	BART Extension from Diridon to Cupertino			-
	14	2207	BART Extension from Diridon to Gilroy (replacing existing Caltrain)			-
	15	2204	BART on I-680 (Walnut Creek to West Dublin/Pleasanton)			-
	16	2203	BART to Hercules & I-80 Bus from Vallejo to Oakland			-

This section of the Confidence Assessment comments on limitations of project performance evaluation across two criteria: Travel Model Accuracy and Framework Completeness. If a criterion is marked X, see comments to the right. Row IDs correspond to Attachment A.

Project Type	Row ID	Project ID	Project	Travel Model Accuracy	Framework Completeness	Comments
Extend Rail Network - Low Cost	17	2312	ACE Rail Service Increase (10 Daily Roundtrips)	X		The travel model is not able to capture project benefits that may accrue to residents outside the nine-county Bay Area. For this reason, an off-model multiplier of 3.3 was used for all benefits of the project to reflect the ratio of expected ridership from outside the region. However, this might under or over represent benefits since ridership is not an accurate proxy for project benefits, but may be the best readily available proxy.
	18	2202	BART DMU Extension to Brentwood			-
	19	2305	SMART to Solano (Novato to Suisun City, without sea level rise protections)		X	The analysis does not capture the cost of investment necessary for protection from sea level rise and hence may overestimate the benefit-cost ratio. The analysis does not capture some potential benefits of the project such as allowing freight rail service and providing infrastructure redundancy during emergency evacuations. Other potential benefits of the project may include providing rural broadband infrastructure and dark fiber access.
	20	2304	SMART Extension to Cloverdale	X	X	Analysis is performed for a typical weekday, but many of the project's benefits may be accrued on weekends due to recreational use and tourism. Further, the analysis does not capture some potential benefits of the project such as allowing freight rail service and providing infrastructure redundancy during emergency evacuations. Other potential benefits of the project may include providing rural broadband infrastructure and dark fiber access.

This section of the Confidence Assessment comments on limitations of project performance evaluation across two criteria: Travel Model Accuracy and Framework Completeness. If a criterion is marked X, see comments to the right. Row IDs correspond to Attachment A.

Project Type	Row ID	Project ID	Project	Travel Model Accuracy	Framework Completeness	Comments
Optimize Existing Transit Network - High Cost	21	2201	BART Core Capacity		X	This project evaluation may be affected by the transit reliability and grade separation limitations discussed in the first section of the Confidence Assessment.
	22	2001	AC Transit Local Rapid Network: Capital Improvements + Service Increase		X	This project evaluation may be affected by the transit reliability limitation discussed in the first section of the Confidence Assessment.
	23	2303	Caltrain Full Electrification and Blended System: High Growth	X	X	This project evaluation may be affected by the transit reliability and grade separation limitations discussed in the first section of the Confidence Assessment. Further, air quality benefits of converting diesel vehicles to electric vehicles are not included in this assessment. However, most of the diesel-electric conversion is already committed and this project would electrify only the few remaining diesel trains.
	24	2302	Caltrain Full Electrification and Blended System: Moderate Growth	X	X	This project evaluation may be affected by the transit reliability and grade separation limitations discussed in the first section of the Confidence Assessment. Further, air quality benefits of converting diesel vehicles to electric vehicles are not included in this assessment. However, most of the diesel-electric conversion is already committed and this project would electrify only the few remaining diesel trains.
	25	2005	Alameda County BRT Network + Connected Vehicle Corridors		X	This project evaluation may be affected by the transit reliability limitation discussed in the first section of the Confidence Assessment.
	26	2410	VTA LRT Systemwide Grade Separation and Full Automation		X	This project evaluation may be affected by the transit reliability and grade separation limitations discussed in the first section of the Confidence Assessment.
	27	2409	VTA LRT Systemwide Grade Separation		X	This project evaluation may be affected by the transit reliability and grade separation limitations discussed in the first section of the Confidence Assessment.
	28	2401	North San Jose LRT Subway		X	This project evaluation may be affected by the transit reliability and grade separation limitations discussed in the first section of the Confidence Assessment.
	29	2411	VTA LRT Systemwide Grade Separation, Network Expansion, and Full Automation		X	This project evaluation may be affected by the transit reliability and grade separation limitations discussed in the first section of the Confidence Assessment.

This section of the Confidence Assessment comments on limitations of project performance evaluation across two criteria: Travel Model Accuracy and Framework Completeness. If a criterion is marked X, see comments to the right. Row IDs correspond to Attachment A.

Project Type	Row ID	Project ID	Project	Travel Model Accuracy	Framework Completeness	Comments
	30	2407	Muni Metro Southwest M-Line Subway	X	X	The travel model does not take into account the 50% discounted Muni Lifeline pass for low income residents. Integrating this program may improve the equity score for the project. This project evaluation may be affected by the transit reliability and grade separation limitations discussed in the first section of the Confidence Assessment.
	31	2301	Caltrain Full Electrification and Blended System: Base Growth	X	X	This project evaluation may be affected by the transit reliability and grade separation limitations discussed in the first section of the Confidence Assessment. Further, air quality benefits of converting diesel vehicles to electric vehicles are not included in this assessment. However, most of the diesel-electric conversion is already committed and this project would electrify only the few remaining diesel trains.
Optimize Existing Transit Network - Low Cost	32	3001	Treasure Island Congestion Pricing	X		The travel model does not take into account the affordability program that is built in to the design of the project, which includes subsidized transit passes and discounts to services such as car/bike share. This may have an adverse impact on the equity score of the project.
	33	6111	Integrated Transit Fare System (with Transit Capacity Expansion)	X		While the evaluation captures increase in ridership due to lower overall fares, it does not take into account the potential increase in ridership from simplifying the existing complex fare system, and hence may be underestimating the benefits of the project.
	34	6112	Integrated Transit Fare System and Seamless Transfers (with Transit Capacity Expansion)	X		While the evaluation captures increase in ridership due to lower overall fares, it does not take into account the potential increase in ridership from simplifying the existing complex fare system, and hence may be underestimating the benefits of the project.
	35	2209	Irvington BART Infill Station	X		Due to the project's smaller size, the travel model may not accurately estimate its benefits relative to the regional scale of the model.
	36	3002	Downtown San Francisco Congestion Pricing			-
	37	2007	San Francisco Southeast Waterfront Transit Improvements	X	X	Travel Model 1.5 has limitations in representing the distinction between types of bicycle facilities, and so may be underestimating the benefits of streetscape improvements that are in the scope of this project. This project evaluation may be affected by the transit reliability limitation discussed in the first section of the Confidence Assessment.

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	38	2100	San Pablo BRT		X	This project evaluation may be affected by the transit reliability limitation discussed in the first section of the Confidence Assessment.
	39	2008	Alameda Point Transit Network Improvements		X	This project evaluation may be affected by the transit reliability limitation discussed in the first section of the Confidence Assessment.

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	40	2000	AC Transit Local Network: Service Increase			-
	41	2101	Geary BRT (Phase 2)	X	X	The travel model does not take into account the 50% discounted Muni Lifeline pass for low income residents. Integrating this program may improve the equity score for the project. This project evaluation may be affected by the transit reliability limitation discussed in the first section of the Confidence Assessment.
	42	2105	Alameda County E14th St/Mission and Fremont Blvd Multimodal Corridor	X	X	Travel Model 1.5 has limitations in representing the distinction between types of bicycle facilities, and so may be underestimating the benefits of streetscape improvements that are in the scope of this project. This project evaluation may be affected by the transit reliability limitation discussed in the first section of the Confidence Assessment.
	43	2103	SamTrans El Camino Real BRT: Capital and Service Improvements		X	This project evaluation may be affected by the transit reliability limitation discussed in the first section of the Confidence Assessment.
	44	2003	Muni Forward: Capital Improvements + Service Increase	X	X	The travel model does not take into account the 50% discounted Muni Lifeline pass for low income residents. Integrating this program may improve the equity score for the project. This project evaluation may be affected by the transit reliability limitation discussed in the first section of the Confidence Assessment.
	45	6100	Integrated Transit Fare System	X		While the evaluation captures increase in ridership due to lower overall fares, it does not take into account the potential increase in ridership from simplifying the existing complex fare system, and hence may be underestimating the benefits of the project.
	46	2004	Sonoma Countywide Bus: Service Increase			-
	47	2400	Downtown San Jose LRT Subway		X	This project evaluation may be affected by the transit reliability and grade separation limitations discussed in the first section of the Confidence Assessment.
	48	6106	Free Transit for Low-Income Households			-
	49	6101	Free Transit for All			-

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Build Local Transit	50	4000	Oakland/Alameda Gondola Network	X		Since mode coefficients based on travel survey data are not available for new modes such as gondolas, they must be represented by existing modes in the Travel Model. This gondola network was represented as LRT, given the fixed guideway. This may not capture different perceptions of users (for example, related to safety) that may result in different travel preferences.
	51	4001	Mountain View AV Network (Free Fare, Subsidies from Companies)	X		Since mode coefficients based on travel survey data are not available for new modes such as AVs, they must be represented by existing modes in the Travel Model. This AV network was represented as LRT, given the fixed guideway and grade separation. This may not capture different perceptions of users (for example, related to safety) that may result in different travel preferences.
	52	2403	Vasona LRT Extension (Phase 2)			-
	53	2412	SR-85 LRT (Mountain View to US101 interchange)			-
	54	2408	Muni Metro T-Third Extension to South San Francisco	X		The travel model does not take into account the 50% discounted Muni Lifeline pass for low income residents. Integrating this program may improve the equity score for the project.
	55	4002	Contra Costa Autonomous Shuttle Program	X		Since mode coefficients based on travel survey data are not available for new modes such as AVs, they must be represented by existing modes in the Travel Model. The AV shuttles were represented as buses given they travel in mixed-flow traffic. This may not capture different perceptions of users (for example, related to safety) that may result in different travel preferences.
	56	4003	Cupertino-Mountain View-San Jose Elevated Maglev Rail Loop			-
	57	2402	San Jose Airport People Mover			-

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Project Type	Row ID	Project ID	Project	Travel Model Accuracy	Framework Completeness	Comments
Enhance Alternate Modes	58	2600	WETA Ferry Service Frequency Increase			-
	59	6006	Enhanced Regionwide Bike Infrastructure	X		Travel Model 1.5 has limitations in representing the distinction between types of bicycle facilities and also the use of bicycle to connect to transit. This project evaluation was supported by literature review. The bicycle mode choice constants, which aggregate a number of descriptors of the attractiveness of that mode, were increased to make bicycling slightly more attractive, based on research on the relationship between density of miles of bike infrastructure per square mile and bicycle commute mode share at the city level. Researchers found that a 1 point increase in miles of bike infrastructure (Class I bike path, Class II bike lane or Class IV protected bike lane) per square miles of city land area was correlated with a 1 percentage point increase in bicycle commute mode share. The mode choice constant was increased to result in a 3.7 percentage point increase in cycling, based on a change in miles of infrastructure density that could be afforded by this project. The project benefits then represent the impact of this modeshare shift on users and the transportation system.
	60	2602	WETA Ferry Service: Berkeley - San Francisco	X		Due to the project's smaller size, the travel model may not accurately estimate its benefits relative to the regional scale of the model.
	61	2700	Bay Bridge West Span Bike Path	X	X	Travel Model 1.5 has limitations in representing the distinction between types of bicycle facilities. Despite this, the project was evaluated since it opens up a major link in bicycle facilities, but the evaluation may not capture the full benefit of a protected facility. Further, analysis is performed for a typical weekday, but many of the project's benefits may be accrued on weekends due to recreational use and tourism.
	62	2603	WETA Ferry Service: Redwood City - San Francisco - Oakland	X		Due to the project's smaller size, the travel model may not accurately estimate its benefits relative to the regional scale of the model.

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	63	4004	Regional Hovercraft Network	X		Since mode coefficients based on travel survey data are not available for new modes such as hovercraft, they must be represented by existing modes in the Travel Model. Hovercrafts were represented as ferries. This may not capture different perceptions of users (for example, related to safety) that may result in different travel preferences.
	64	6004	Bay Trail Completion	X		Travel Model 1.5 has limitations in representing the distinction between types of bicycle facilities. Hence, this project was not evaluated on its own, but instead as part of the "Enhanced Regionwide Bike Infrastructure" project.
	65	6005	Regional Bicycle Superhighway Network	X		Travel Model 1.5 has limitations in representing the distinction between types of bicycle facilities. Hence, this project was not evaluated on its own, but instead as part of the "Enhanced Regionwide Bike Infrastructure" project.
Build Road Capacity - High Cost	66	1001	Southern Crossing Bridge + New San Francisco-Oakland Transbay Rail Crossing - BART (Crossing 6)		X	The analysis does not capture the benefits of providing redundancy in the San Francisco-Oakland Transbay Corridor.
	67	3000	Regional Express Lanes (MTC + VTA + ACTC + US-101)	X		The travel model has difficulty representing the benefits of an operational strategy that relies on real-time price changes throughout the morning and evening commute periods. Fixed toll values were determined for each segment/direction of the express lanes for each different time period in the model by calibrating the tolls to achieve a desired speed of 45mph.
	68	1005	Mid-Bay Bridge (I-238 to I-380) (Crossing 2)		X	The analysis does not capture the benefits of providing redundancy in the San Francisco-Oakland Transbay Corridor.
	69	1006	San Mateo Bridge Reconstruction and Widening (Crossing 1)			-
Build Road Capacity - Low Cost	70	3101	I-680/SR-4 Interchange Improvements (Direct/HOV Connectors, Ramp Widening, Auxiliary Lanes)	X		The model does not explicitly represent weaving (thus ignoring the benefits of longer weaving sections) or acceleration or deceleration behavior. Further, while the model is able to represent the increase in travel time due to high traffic volumes on any given road link, it does not explicitly represent queue spillback.
	71	3110	Union City-Fremont East-West Connector	X		Due to the project's smaller size, the travel model may not accurately estimate its benefits relative to the regional scale of the model.
	72	3102	SR-4 Operational Improvements	X		The model does not explicitly represent weaving (thus ignoring the benefits of longer weaving sections) or acceleration or deceleration behavior. Further, while the model is able to represent the increase in travel time due to high traffic volumes on any given road link, it does not explicitly represent queue spillback.

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Project Type	Row ID	Project ID	Project	Travel Model Accuracy	Framework Completeness	Comments
	73	3104	I-80/I-680/SR-12 Interchange + Widening (Phases 2B-7)	X		The model does not explicitly represent weaving (thus ignoring the benefits of longer weaving sections) or acceleration or deceleration behavior. Further, while the model is able to represent the increase in travel time due to high traffic volumes on any given road link, it does not explicitly represent queue spillback.
	74	3103	SR-4 Widening (Brentwood to Discovery Bay)			-
	75	3106	SR-152 Realignment and Tolling	X		The model's ability in estimating freight travel behavior is limited and so it may be underestimating the freight benefits of this project, both in terms of the number of truck trips and the impacts of steep grades on trucks. The modeling assumes that land use is the same with and without the project, potentially over-estimating the travel time savings of this project.
	76	3109	SR-262 Widening and Interchange Improvements	X		While the model is able to represent the increase in travel time due to high traffic volumes on any given road link, it does not explicitly represent queue spillback.
	77	3100	SR-239 Widening (Brentwood to Tracy including Airport Connector)	X		Because the land uses outside of the 9-county Bay Area are not explicitly represented, the model does not fully understand the likely impact of projects located near the boundaries of the planning region. The modeling assumes that land use is the same with and without the project, potentially over-estimating the travel time savings of this project.
	78	3105	SR-12 Widening (I-80 to Rio Vista)	X		Because the land uses outside of the 9-county Bay Area are not explicitly represented, the model does not fully understand the likely impact of projects located near the boundaries of the planning region.

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Optimize Existing Freeway Network	79	5000	Bay Area Forward (Phase 1: Freeway Ramp and Arterial Components Only)	X		The model is likely overestimating the benefits of arterial signal coordination in dense, urban environments. The model is likely underestimating the safety benefits of advanced queue-warning and connected vehicles.
	80	6103	Demand-Based Tolling on All Highways with Means-Based Tolls	X		The travel model has difficulty representing the benefits of an operational strategy that relies on real-time price changes. Fixed toll values were determined for each segment/direction of all lanes for each different time period in the model by calibrating the tolls to achieve a desired speed of 45mph.
	81	6102	HOV Lane Network with per-mile fee for SOVs			-
	82	3003	San Francisco Arterial HOV and Freeway HOT Lanes	X		The travel model has difficulty representing the benefits of an operational strategy that relies on real-time price changes throughout the morning and evening commute periods. Fixed toll values were determined for each segment/direction of the express lanes for each different time period in the model by calibrating the tolls to achieve a desired speed of 45mph.
	83	2002	AC Transit Transbay Network: Capital Improvements + Service Increase		X	This project evaluation may be affected by the transit reliability limitation discussed in the first section of the Confidence Assessment.
	84	6022	Bus Rapid Transit (BRT) on All Bridges: Dedicated Lanes + Service/Capacity Improvements		X	This project evaluation may be affected by the transit reliability limitation discussed in the first section of the Confidence Assessment.
	85	6020	Regional Express (ReX) Bus Network + Optimized Express Lane Network	X		The ReX express bus network was represented with mode choice coefficients used for existing express buses. However, given that ReX Express Routes in particular are designed to be "train-like" through the use higher quality and more attractive infrastructure, the project benefits may be underestimated.
	86	5003	I-680 Corridor Improvements (BRT, Express Bus, Shared AVs, Gondolas)	X		Since mode coefficients based on travel survey data are not available for new modes such as gondolas and AVs, they must be represented by existing modes in the Travel Model. The gondola network was represented as LRT given the fixed guideway, and the AV shuttles were represented as buses given they travel in mixed-flow traffic. This may not capture different perceptions of users (for example, related to safety) that may result in different travel preferences.
	87	6104	Reversible Lanes on Top 10 Congested Bridges and Freeways			-

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	88	6003	I-80 Corridor Overhaul with Per-Mile Tolling	X	X	While the model is able to represent the increase in travel time due to high traffic volumes on any given road link, it does not explicitly represent queue spillback. This project evaluation may be affected by the transit reliability limitation discussed in the first section of the Confidence Assessment.
	89	6021	Bus Rapid Transit (BRT) on All Bridges: Dedicated Lanes only		X	This project evaluation may be affected by the transit reliability limitation discussed in the first section of the Confidence Assessment.
	90	6105	Timing Regulation of Freight Delivery	X		The model's ability in estimating freight travel behavior and its interaction with the freeway network is limited, and hence this project was not evaluated given its focus on freight.
Resilience	91	7002	I-580/US-101/SMART Marin Resilience Project		X	The project benefits are estimated relative to a baseline without the transportation asset. As such, the benefits may be overestimated since flooding may not occur until later in the analysis period.
	92	7005	SR-237 Resilience Project (Alviso)		X	The project benefits are estimated relative to a baseline without the transportation asset. As such, the benefits may be overestimated since flooding may not occur until later in the analysis period.
	93	7006	I-880 Resilience Project (South Fremont)		X	The project benefits are estimated relative to a baseline without the transportation asset. As such, the benefits may be overestimated since flooding may not occur until later in the analysis period.
	94	7004	SR-84 Resilience Project (Dumbarton Bridge, 101 Interchange)		X	The project benefits are estimated relative to a baseline without the transportation asset. As such, the benefits may be overestimated since flooding may not occur until later in the analysis period.
	95	7003	US-101 Peninsula Resilience Project (San Antonio Rd, Poplar Ave, Millbrae Ave)		X	The project benefits are estimated relative to a baseline without the transportation asset. As such, the benefits may be overestimated since flooding may not occur until later in the analysis period.
	96	7001	VTA LRT Resilience Project (Tasman West)		X	The project benefits are estimated relative to a baseline without the transportation asset. As such, the benefits may be overestimated since flooding may not occur until later in the analysis period.
	97	3200	SR-37 Long Term Project (Tolling, Elevation, Interchanges, Widening, Express Bus)	X	X	While the model is able to represent the increase in travel time due to high traffic volumes on any given road link, it does not explicitly represent queue spillback. Further, the project benefits are estimated relative to a baseline without the transportation asset. As such, the benefits may be overestimated since flooding may not occur until later in the analysis period.