



Business Plan

Delivering the Vision



Rendering: Elevated high-speed train on the Pacheco Viaduct



Brian P. Kelly

FROM THE CEO

Nothing worth doing is easy.

Building the nation's first truly high-speed rail system is certainly not easy. But it is not only worth doing, it is in California's interest to maintain its position as a global leader when it comes to economic standing, efforts to combat the effects of climate change and building world-class infrastructure to ensure Californians can move efficiently and effectively even as the state's population grows toward 50 million people.

The voters of California who approved the development of an electrified high-speed rail system connecting Northern and Southern California through the Central Valley got it right. This project will transform and improve the way Californians move for generations to come. And it remains an exceptional value:

- The high-speed rail system we are building between San Francisco and Los Angeles/ Anaheim will cost about half as much as it would cost to achieve roughly equivalent

mobility benefits through expanding highways and airports—and high-speed rail is much more sustainable;

- The mobility benefits achieved by completing the electrified high-speed rail system are unparalleled, reducing the time it takes to travel by train today from 12 hours—or by car from 7 or 8 hours—between the Bay Area and Southern California to under 3 hours by fast, electrified rail. For Californians, the system would virtually shrink the state, turning regions into Megaregions and expanding options for where people can live and work, or where companies can conveniently locate facilities, offices or other job centers.
- By 2040, the system will carry some 40 million riders and produce some \$4.5 billion in farebox revenue each year, easily covering costs of operations.
- Completing the Phase 1 system, connecting San Francisco to Los Angeles/Anaheim through the communities of the Central Valley, will expand project employment by more than 600,000 job-years and produce some \$131 billion in economic output.
- At full operations, the reduction of greenhouse gas emissions from the system is the equivalent of removing 400,000 vehicles off the road, avoiding the consumption of 213 million gallons of gasoline and removing more than 3,500 tons of harmful pollutants from the air—each year.

California is the national leader in transforming transportation to meet mobility, environmental and economic goals. This achievement is not by accident.

Years of policy development and investment have positioned California as the national leader

in transforming our transportation system from a fossil-fuel dependent system to one moving toward electrification. In high-speed rail's case, our zero-emission electric trains will be powered by renewable energy. Through policy development at the California Air Resources Board (CARB) and deliberate funding proposals approved by the legislature, from the state's Cap and Trade program to the recently-enacted SB 1 (legislation that made the largest investment in public transit in the state's history), California is marching toward an electrified transportation system in vehicular travel, in public transit, and in passenger rail service. This transformation is happening, considerable progress is being made, and now is not the time to turn back.

The High-speed rail project in California commenced with the approval of Proposition 1A in 2008. That ballot measure, approved by two-thirds of the legislature and 53 percent of the voters, set the mission for the California High-Speed Rail Authority:

“To initiate the construction of a high-speed train system that utilizes an alignment and technology capable of sustained speeds of 200 miles per hour or greater.”

Proposition 1A provided \$9 billion to commence the project, estimated at the time to cost \$45 billion to complete. The bond measure, therefore, provided 20 percent of the estimated cost of the project. Voters approved the bond measure expecting the state to match the bond funds with other funding—state, local, federal and private. In the nearly twelve years since the bond bill passed, those bond funds have been matched:

- \$3.5 billion in federal funds;
- \$8.7 billion to \$11.4 billion in Cap and Trade funds through 2030; and
- \$2 billion in other matching funds for bookend and other shared-corridor projects.

In 2020, for the first time, we see the emergence of private-sector interest in electrified high-speed rail in California with the promise of the \$5 billion Virgin Trains project from Las Vegas, Nevada to San Bernardino County.

Between now and 2030, the Authority has a budget of between \$20.6 billion and \$23.4 billion to advance the program. The range reflects the ebb and flow of the Cap-and-Trade auction market. At the low end, we assume Cap-and-Trade provides the Authority with \$500 million per year, and at the high end, we assume Cap and Trade provides \$750 million per year. Since the enactment of AB 398 (Statutes of 2017), the legislation that extended the Cap and Trade program to 2030, the Authority is receiving about \$740 million annually for project development.

While this amount of funding is considerable, it is not enough to build the entirety of the Phase 1 High-speed rail project connecting San Francisco-Los Angeles/Anaheim—not based on 2020 cost estimates nor on cost estimates from 2008, when the bond bill originally passed. However, our budget is sufficient enough to advance the mission the voters gave us when they passed Proposition 1A and to continue to make important investments in all three regions of the state. With the estimated funding we have committed to this project between now and 2030, we will:

1. Complete the 119-mile Central Valley construction segment and lay track pursuant to our federal funding grant agreements with the Federal Railroad Administration;

2. Expand the 119-mile Central Valley segment to 171 miles of operable electrified high-speed rail connecting Merced-Fresno-Bakersfield, three of the fastest growing areas in California;
3. Commence testing of electrified high-speed trains by 2025 and put those trains in service by 2028-29;
4. Environmentally clear all segments of the Phase 1 system between San Francisco and Los Angeles/Anaheim in the next 18-24 months;
5. Complete the “bookend” projects we have committed funding to in Los Angeles and the Bay Area—projects valued at more than \$3 billion;
6. Pursue additional funding opportunities to prospectively “close the gaps” and expand electrified high-speed rail service to the Bay Area and Los Angeles/Anaheim.

The fact is electrified high-speed rail is advancing in all three regions of California—the Bay Area, Central Valley and Southern California. In 2020, 350 miles of electrified high-speed rail is moving toward construction:

- 51 miles of electrified commuter rail service between San Francisco and San José;
- 171 miles of the nation’s first truly high-speed service in the Central Valley; and
- 130 miles in Southern California connecting Las Vegas, Nevada and San Bernardino County in California.

Environmentally clearing the entire Phase 1 system between San Francisco-Los Angeles/Anaheim over the next 18-24 months is an important milestone. This achievement will enable the Authority to advance design and conduct important pre-

construction activities, such as right-of-way acquisition and utility relocations. It will also enable us to further refine our cost estimates and pursue funding to close the gaps between the Central Valley, the Bay Area and the Los Angeles Basin.

Over a decade ago the federal government selected the Central Valley as the place construction would commence for high-speed rail in California. It did so by choosing this location for a \$2.5 billion federal grant under the American Recovery and Reinvestment Act (ARRA) in 2009. A year later, in the FY 2010 Appropriations bill, the Authority received another grant of \$929 million to construct the first 119-miles of high-speed rail between Madera and Poplar Avenue, an orchard area about twenty miles north of Bakersfield.

We broke ground in 2015 and construction is advancing today on this initial construction segment, with three Design-Build Joint Venture firms dispatching more than 3,200 workers to the construction sites. More than 500 small businesses, mostly from California, have added their expertise to the job, and the economic impact from the investment to date well exceeds \$8 billion.

Notwithstanding the clear economic benefits associated with this initial investment, the initial construction segment, with a southern terminus in orchard fields north of Bakersfield, has been criticized by project opponents as a “train to nowhere.” We first took on this criticism by proposing, in our 2018 Business Plan, to extend the Silicon Valley to Central Valley segment from San Francisco all the way into Bakersfield, acknowledging this stretch as our highest ridership and revenue option for Silicon Valley to Central Valley service. In 2019, working closely with the community in Bakersfield, we environmentally cleared the 18-mile alignment to get us from Poplar Avenue into the city of Bakersfield.

In our 2019 Project Update Report, we recommended extending the 119-mile stretch in the Central Valley to a 171-mile line connecting Merced, Fresno and Bakersfield for early interim service. This was after our Early Train Operator (ETO), DB Engineering & Consulting USA, confirmed that there would be important mobility, environmental and financial benefits to the state and region by building and opening this line for service. Our recommendation was also based on our conclusion that this line can be delivered with currently available funding. Subsequently, the Board of Directors Board prudently requested two additional analyses on this proposal, one from our financial advisor, KPMG, and the other from our ETO.

Based on the results of these studies, which are summarized in Chapter 3 of this Draft 2020 Business Plan, we affirm our recommendation to extend the Central Valley Segment to 171 miles connecting Merced, Fresno and Bakersfield. We have performed due diligence on this approach; three separate analyses conducted by two different entities recommend proceeding with this investment and delivering the first operational high-speed rail line in America, providing key mobility, economic and environmental benefits to California and to the region where it all began, the Central Valley. Some of the key findings of these studies include:

- **Economic benefits** - Merced to Bakersfield interim service will generate significant economic benefits, with the \$20.4 billion capital program projected to generate about \$38 billion in total economic activity and over 200,000 job-years of employment.
- **Mobility benefits** - High-speed train service will unlock mobility benefits by providing faster service (shaving travel time by 90 to 100 minutes), more than doubling service

frequency, and enhancing connectivity to other passenger rail systems – more than doubling passenger rail ridership in the corridor.

- **Environmental benefits** - With faster, more frequent electrified high-speed train service, many people will shift from driving to trains which results in reduced greenhouse gas emissions and other pollutants, improving air quality in the Central Valley.

Because of these myriad benefits, and because the Merced to Bakersfield line will be environmentally cleared this year, we continue to recommend developing the 171-mile alignment for early interim service. The Board's adoption of this plan will enable the Authority to immediately begin the necessary pre-construction work toward Merced and Bakersfield, including further advancing design, acquiring right of way, and developing a strategy for utility relocations—all prerequisites to begin construction on these extensions.

Although the ETO's analysis concludes that the best use of funds that are available and dedicated to high-speed rail is to complete the Merced-Bakersfield segment for early passenger service, the Authority in no way diminishes the value of commuter rail improvements planned in the Bay Area or Southern California. We have been a strong funding partner for projects in both regions—\$1.6 billion in the Bay Area and \$1.3 billion in Southern California—and we will continue to be a full partner in the development of capital improvements necessary to develop the corridors our systems will share as electrified high-speed rail expands statewide. Moreover, as noted, we will continue to environmentally clear shared corridors in both regions so that investments can be made that will benefit these regional services in the short term and benefit high-speed rail when our service arrives in those corridors.

As Governor Newsom concludes his first year in office, there has been dramatic change here at the Authority. We welcomed four new board members and an almost entirely new executive management team, including a new Chief Financial Officer, Chief Counsel, Director of Engineering, Chief of Strategic Communications, Director of Real Property, Director of Legislation, and Director of Planning and Sustainability, just to name a few. We are adding on greater capacity in 2020.

Also, working off the recommendations made by the California State Auditor in November 2018, we have undertaken a division-by-division review of the roles of state staff and consultants to ensure the form of the organization meets its function.- The governor placed an emphasis on transparency, accountability and performance here at the California High-Speed Rail Authority, and we are doing business dedicated to those principles. As described in Chapter 2, this new direction and these changes are yielding positive results.

It's true that nothing worth doing is easy. However, when the mission is clear and the team is dedicated to getting the work done, small achievements build on one another, progress occurs, and delivering on the vision becomes inevitable. There is a lot of work left to do, but in 2020 we are delivering the vision of the first true high-speed rail system in America right here in California, just as the voters asked us to do.



Brian P. Kelly
Chief Executive Officer



Rendering: Cedar Viaduct crossing over State Route 99

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Rendering: Possible California high-speed train concept

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Rendering: High-speed rail station

CLEAN TRANSPORTATION IN THE ERA OF CLIMATE CHANGE

California leads the nation in rail modernization. Over the last decade, California policy leaders have been orienting transportation policies and funding programs around clean transportation, including developing a modern, electrified passenger rail system that creates new mobility options for Californians.

California is at the national forefront in addressing climate change, enacting aggressive policies to reduce greenhouse gas (GHG) emissions. Assembly Bill 32, the California Global Warming Solutions Act of 2006, and subsequent executive action, require a sharp reduction of GHG emissions—to 80 percent below 1990 levels by 2050—setting California on the path to a sustainable, low-carbon future. The high-speed rail system is key to that transformation.

The launch of California’s Cap-and-Trade Program in 2013, and its extension in 2017 by the Legislature to 2030 (Assembly Bill 398), further bolstered these policy objectives, making it a key component of the state’s climate plan. Proceeds from Cap-and-Trade auctions are used to fund high-speed rail and other state, regional and local intercity rail projects that reduce GHG emissions, furthering investments in a modern, sustainable transportation system. Chapter 4 of this 2020 Draft Business Plan outlines strategies to continue efforts to fund policy objectives designed to further transform the state’s transportation sector from a fossil fuel-based system to one expanding electrification and other clean transportation projects throughout the state.

CHAPTER 1

In 2018, the California State Rail Plan laid out a vision for a modern, integrated statewide passenger rail system connecting all urban, suburban and rural communities with frequent, reliable service. The State Rail Plan creates a framework to provide the mobility that Californians will need in the future, to protect the environment and to help invigorate California’s cities.

California high-speed rail is the backbone of the State Rail Plan and is central to the state’s climate policies. Electrified high-speed rail—powered by 100-percent renewable energy—is key to transforming California’s transportation system in an era where addressing climate change has become increasingly urgent. We are building that system now, and California is leading the nation toward a faster, cleaner, more sustainable transportation future.

Exhibit 1.0: Where We Are in 2020



ELECTRIFIED HIGH-SPEED RAIL TODAY

The transformation of traditional passenger rail to clean, fast, electrified high-speed rail in California is happening now. Altogether, 350 miles are in development or construction and the full Phase 1 system will be fully environmentally cleared in the next 18 to 24 months and ready for pre-construction.

2020: 350 MILES OF ELECTRIFIED HIGH-SPEED RAIL IS IN DEVELOPMENT

Currently, 350 miles of electrified high-speed rail are under development or in construction in California, as shown in **Exhibit 1.0**:

- In the Central Valley, we are currently building 119 miles of high-speed rail infrastructure. With available funding, we propose advancing 52 more miles to deliver an initial 171-mile operating line between Merced and Bakersfield with seamless connections to other passenger rail systems—the San Joaquins and the Altamont Corridor Express (ACE) at Merced and Thruway Bus services at Bakersfield—until the Silicon Valley to Central Valley Line is fully built;
- Statewide, within the next 18 to 24 months, we will environmentally clear the remaining sections of the Phase 1 system between San Francisco and Los Angeles/Anaheim;
- In the Bay Area, Caltrain is electrifying the 51-mile commuter rail corridor between San Francisco and San José. We contributed \$714 million to help convert this heavily used commuter rail corridor from diesel to clean, electric service and to lay the foundation for a high-speed rail shared use corridor;
- In Southern California, Virgin Trains USA is developing a 180-mile electrified high-speed rail line between Las Vegas, Nevada, and San Bernardino County, California, 130 miles of which are in California, with plans to break ground in 2020. We are working closely with Virgin Trains USA to share information and explore opportunities for joint planning, development and advancing a public-private partnership to extend service to Palmdale and into the Los Angeles Basin;
- In the Los Angeles Basin, we are partnering with the Los Angeles County Metropolitan Transportation Authority (LA Metro), contributing \$442 million to Phase A of the Link Union Station (Link US) project, which will transform Los Angeles Union Station into a world-class transit and mobility hub that will include high-speed rail trains; and
- In the Burbank to Anaheim and San José to Gilroy corridors, we are environmentally evaluating joint improvements in shared corridors that will not only support high-speed rail but also improve existing commuter rail services. These improvements will provide early benefits and increase mobility through this critically important rail corridor.

Exhibit 1.1: High-Speed Rail in 2022



2022: 350 MILES OF ELECTRIFIED HIGH-SPEED RAIL UNDER CONSTRUCTION

By 2022, a total of 350 miles of electrified high-speed rail infrastructure could be under construction setting the foundation for delivering electrified high-speed rail service throughout California (**Exhibit 1.1**):

- Civil construction work on the 119-mile section between Madera and Poplar Avenue, including track, will be concluding and work will be underway to electrify the corridor;
- The Bakersfield and Merced extensions—52 miles altogether—will be conducting pre-construction activities in advance of moving into full civil construction;
- The Phase 1 system from San Francisco to Los Angeles/Anaheim will be environmentally cleared and ready for pre-construction activities;
- By 2022, Caltrain’s Peninsula Corridor Electrification Project in Northern California is scheduled to be complete, resulting in improved, electrified commuter trains carrying passengers between San José and San Francisco;
- Virgin Trains USA could have approximately 130-miles of high-speed rail in Southern California under construction presenting the first evidence of private sector participation in the construction and operation of electrified high-speed rail in California; and
- The Authority is actively collaborating with Virgin Trains USA on potential strategies on interoperability and expansion of electrified high-speed rail infrastructure south from Palmdale to Los Angeles/Anaheim.

With these steps, 350 miles of electrified high-speed rail will be complete, in pre-construction or under construction in California in 2022, and the Phase 1 system will be environmentally cleared.

MOBILITY, ENVIRONMENTAL AND ECONOMIC BENEFITS

California’s history of investing in transportation infrastructure has been key to making the state an economic powerhouse. By enabling people and goods to move relatively easily between our population and economic centers, those prior investments advanced the state’s economy to what it is today; the 5th largest economy in the world.

CALIFORNIA’S ROADS AND AIRPORTS ARE REACHING GRIDLOCK

Today’s population of 40 million people is straining the state’s transportation network. California’s Department of Finance projects that our population will grow to 50 million people by 2055. California’s metropolitan areas already have some of the most grueling commutes in the nation. Travel between cities is plagued by delays, as well, because our highways and roads rank among the busiest in the nation and are nearing, or already exceeding, their capacity. Similarly, California’s airports are at or near full capacity, making them perpetually crowded with long lines and with flight delays common.

At the same time, demand for travel between our population and economic centers—for business, recreation, education and other purposes—is growing:

- In 2018, federal data shows that 13 million passengers flew between the Los Angeles Basin and the Bay Area—making it the single largest air market in the United States. California’s major airports have seen a 15-percent increase in intrastate air passengers from 2000 to 2017; and
- According to California’s 2018 State Rail Plan, Interregional travel is forecasted to increase to 544.7 million trips annually by 2040 on all modes of travel, compared to the estimated 361 million annual interregional trips that Californians took in 2010.

To keep pace, California must expand transportation capacity to improve mobility while meeting the state’s environmental and sustainability objectives. Electrified high-speed rail meets these objectives efficiently. Without more

capacity in the system, people who want or need to travel between California’s major cities in the future will experience increased congestion and more delays which will hinder economic growth and thwart our climate change objectives. Adding the Phase 1 high-speed rail system to the state’s transportation network is equivalent to adding a new major airport and a six-lane highway between San Francisco and Los Angeles. This is based on the analysis shown on page 17.

"The Authority’s report includes estimates for highway capacity and cost that are within the ranges that Caltrans has experienced in recent years."

*— Toks Omishakin, Director
California Department of Transportation*



WHAT IS THE SMARTEST WAY TO MOVE AROUND THE STATE?



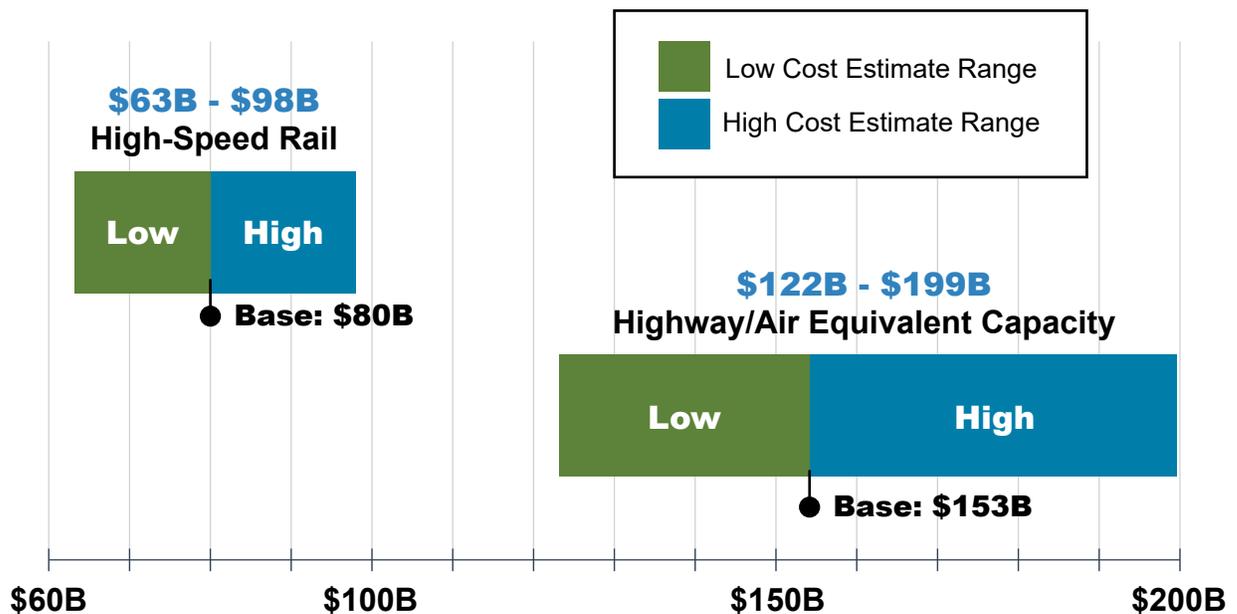
HIGH-SPEED RAIL: A BETTER VALUE THAN BUSINESS AS USUAL

The Authority's 2019 Equivalent Capacity Analysis Report updates capital costs and other assumptions and discusses the impact growth has had since 2012 on California highways and airports.

The report's key finding shows that California would need to construct approximately 4,200 highway lane-miles and add 91 airport gates and build 2 new airport runways (which is comparable to building a new San Francisco International Airport), to provide capacity equivalent to the Phase 1 high-speed rail system.

As shown in **Exhibit 1.2**, the equivalent roadway and airport capacity would cost about twice as much as high-speed rail and would not advance California's climate goals. Specifically, the report shows that compared to the \$80 billion (YOES) base cost estimate of the Phase 1 system, equivalent highway/airport capacity is estimated to cost approximately \$153 billion (YOES). Consistent with the practices we established in our 2018 Business Plan, these estimates are shown in a range. For more information on this report, see https://hsr.ca.gov/docs/about/business_plans/2020_Business_Plan_2019_Equivalent_Capacity_Analysis_Report.pdf.

Exhibit 1.2: Cost of Phase 1 High-Speed Rail Compared to Equivalent Cost in Highway/Air Capacity



High-speed rail will allow California's airports to focus their resources on addressing the growing demand for interstate and international travel, a major catalyst for sustaining economic growth, and will alleviate growing pressure on our crowded roadways.

ELECTRIFIED HIGH-SPEED RAIL CREATES A NEW MOBILITY

High-speed rail will fundamentally transform how people travel in California. Electrified high-speed trains traveling at speeds of more than 200 miles per hour will connect California's cities, making a trip between Los Angeles and San Francisco in under three hours. These kinds of speeds and travel times are not possible with diesel passenger trains, even those diesel trains that meet the highest emissions standards possible.

Exhibit 1.3 shows the time savings that travelers will realize with high-speed trains connecting the state, including the 3-hour trip between the Bay Area and Los Angeles. Trips to and from the Central Valley and California's coastal cities, such as Fresno to Los Angeles, will take half the time it currently takes to drive. Although flying may be faster for some trips, in terms of actual flight times, a relatively fast hour-and-a-half flight can quickly turn into four or more hours when getting to and from the airport, going through security and waiting in line to board are factored into the travel equation.

The Comparative Travel Times exhibit also shows the faster trip times for travelers on the Merced to Bakersfield corridor. Where it now takes 2.5 hours by car to travel between Merced and Bakersfield—and more than 3 hours by existing diesel passenger trains—travel times will be cut in half. Passengers traveling through this corridor on to other destinations will be able to make convenient

connections in Merced to continue traveling to the Bay Area on ACE trains or to Sacramento on San Joaquins trains. In Bakersfield, passengers will catch timed connections to Thruway Buses to continue traveling to destinations in the Los Angeles Basin.

As more people shift to taking high-speed rail, this capacity will become available at our busiest airports and roadway congestion will be reduced on our overburdened highways. Many countries that initiated high-speed rail service between two destination cities—such as San Francisco and Los Angeles—have seen a considerable shift from cars and planes to high-speed rail. For example, when high-speed rail was introduced between Madrid and Seville, Spain, the share of trips taken by plane was reduced from 40 percent to 13 percent and rail trips grew from 16 percent to 51 percent.¹

"Greenhouse gas emissions from the transportation sector are rising and there is now no doubt that rapid electrification of the state's transportation system is key to reversing that trend and achieving our climate and air quality goals in California."

*— Mary Nichols, Chair
California Air Resources Board*

Exhibit 1.3: Comparative Travel Times - Car, Existing Rail, and Non-Stop High-Speed Rail



*All travel times are approximate. Trips are measured from central business district, existing passenger rail stations, or planned high-speed rail stations. Approximate car travel times were estimated based on the California Statewide Travel Demand Model. Existing passenger rail travel times were approximated using the Amtrak website, referencing schedules current as of publication. High-speed rail travel times are for non-stop service and were estimated by the Authority using internal modeling, which includes at least 5% padded time. Run times do not take into account integration with other operators' services in blended sections.



Rendering: High-speed rail visualization in the Central Valley

DELIVERING ON CALIFORNIA'S CLIMATE CHANGE GOALS

Californians voted for high-speed rail as the means to achieve essential climate and economic development goals, and we have honored that trust by working to create the greenest infrastructure project in the nation. For the past decade, we have focused on construction practices that deliver measurable results in construction, operations and station development.

Our zero-emission trains will be powered by 100-percent renewable energy. Our stations and other facilities will be designed to be "net zero" energy, increasing environmental benefits and reinforcing California's renewable energy economy. We already require that our construction contractors use clean equipment, which has resulted in our construction sites being 50 to 60 percent cleaner than typical California construction sites, with 97 percent of all construction waste recycled to date. We have preserved more than 2,680 acres for natural habitat and restoration and planted more than 1,200 trees in the Central Valley to offset emissions produced through construction.

ELECTRIC HIGH-SPEED RAIL TRAINS: THE CLEANEST PASSENGER RAIL VEHICLES AVAILABLE

Electric trains are powered by renewable energy compared to finite fossil fuels. Electrified high-speed rail plays a unique role in emissions reductions. Due to the dramatic travel time savings relative to interregional automobile trips, high-speed trains can move more people farther and faster with zero emissions. High-speed rail also attracts passengers from air travel, a transportation sector that is very difficult to decarbonize.

Regulators in California and the federal government have worked with industry to progressively improve the cleanliness of diesel engines. This reduces the amount of pollution produced by these diesel engines, but does not eliminate GHG emissions. Although the cleanest (Tier 4) diesel engines are progressively cleaner from an air quality standpoint, they still produce criteria pollutants and GHG emissions whereas electric high-speed rail trains eliminate the pollution from current diesel rail operations. For example, in 2032, a Tier 4 diesel train running service in the state would emit about 6,500 metric tons of carbon dioxide. In contrast, an electric high-speed train running the same service will reduce 416,000 metric tons of greenhouse gas emissions. Further, by attracting riders from fossil-fuel-driven modes, high-speed rail is a foundational part of the state's approach to climate mitigation.

It is important to recognize that the Central Valley and Southern California suffer from some of the worst air pollution in the nation. These are places we must strive to deliver truly clean transportation. Children under the age of 4 in the Central Valley visit the emergency room or are hospitalized with asthma related issues at twice the rate compared to the rest of California. Adults in Kings County head to the emergency room or are hospitalized with asthma related illness 80 percent more than the rest of California; in Fresno County, 50 percent more.²

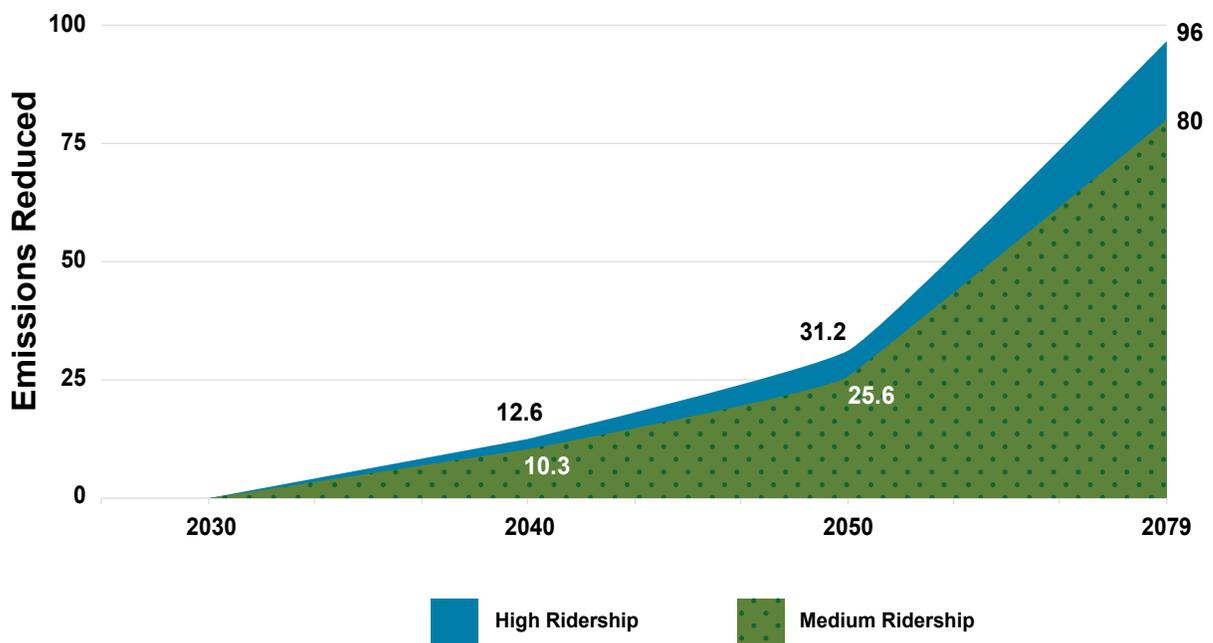
"It's also useful to outline that, in our experience, there is no high-speed rail without electrification."

— Pedro Fortea
General Director & Executive Vice President
MAFEX Spanish Railway Association

Every mile traveled on electrified high-speed rail is a mile not traveled by car or by airplane. **Exhibit 1.4** shows the projected GHG emission reductions that are attributable to people switching to high-speed rail. These emissions reductions are based on our updated ridership forecasts and reflect the medium and high ridership scenarios that we prepare for business plans.

"Air pollution, particularly from diesel operation, triggers asthma and asthma attacks. It's one of the worst and most dangerous substances in the world you can breathe and no matter what you're told there is no such thing as 'clean diesel.'"
 — Kevin D. Hamilton
 RRT Co-Director/Co-Founder
 Central California Asthma Collaborative

Exhibit 1.4: Projected Cumulative GHG Reductions by 2040, 2050 and by 2079 (in Million Metric Tons of Carbon Dioxide Equivalents - MMTCO₂e)



Over time, the average annual GHG emissions savings of the system, 1.9 million metric tons of carbon dioxide equivalent, is projected to be the equivalent of taking 400,000 passenger vehicles off the road, and 213 million gallons of gasoline avoided, every year. In addition, on average every year, more than 3,500 tons of harmful pollutants are kept out of the air.

- The environmental benefits cited above are just the beginning, because high-speed rail will transform how people choose to complete their train trip. Because high-speed rail stations are being designed to be multimodal transportation hubs in our largest cities, a connecting subway, bus, rideshare and/or walking trip will be a more convenient way to make those first mile/last-mile connections. Finally, the convenience of high-

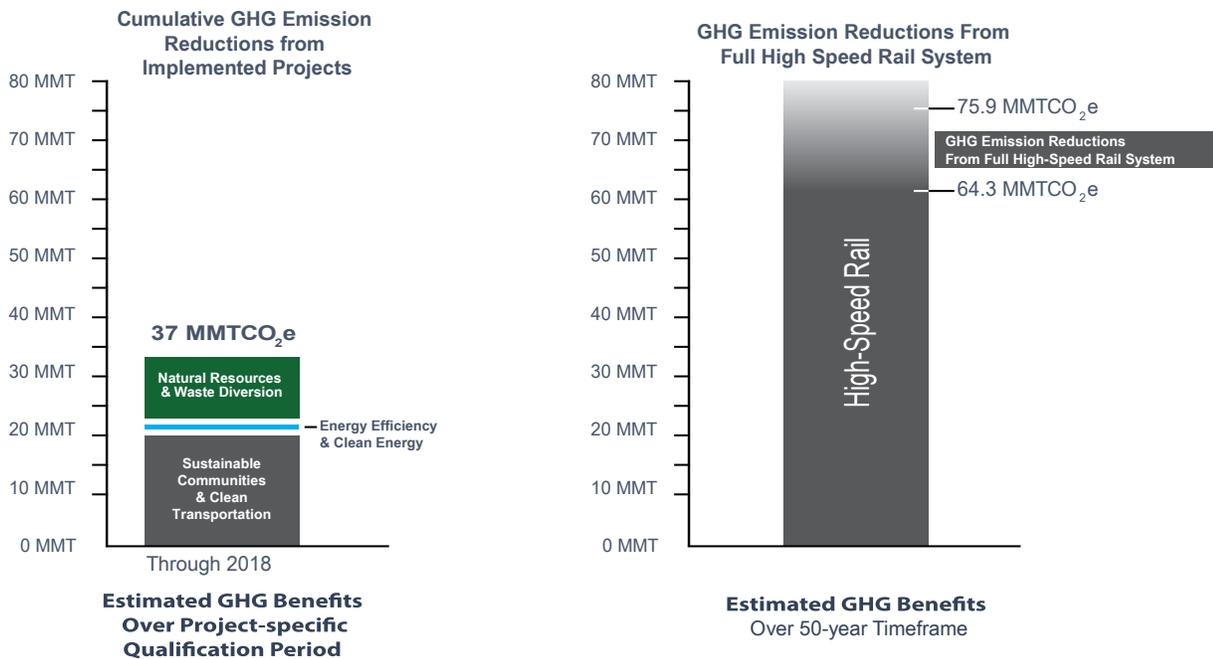
speed transportation to major cities around the state will increase the attractiveness of urban station area investment, both residential and commercial. High-density urban infill development will multiply the GHG reduction benefits as high-quality rail travel stimulates more urban infill which, in turn, generates more riders.

Crucially, high-speed rail investments being made to achieve long-term emission reductions have also been legally mandated to provide near-term benefits, particularly in disadvantaged communities. In the Central Valley, air quality will improve as automobile emissions are reduced.

The result will be hundreds of thousands of tons of reduced pollutants that affect human health.

Every year the California Air Resources Board (CARB) presents a report to the California Legislature on the investments of Cap-and-Trade proceeds. The graph below (**Exhibit 1.5**) shows the significant contribution of high-speed rail service to GHG emissions reductions. This investment of funds delivers a substantial return on investment. CARB anticipates releasing an updated report in March 2020 with revised figures for cumulative GHG emission reductions from implemented projects.

Exhibit 1.5: Climate Investments and Greenhouse Gas Emissions Reductions



SUSTAINING ECONOMIC GROWTH AND OPPORTUNITY

Connecting California's economic centers with high-speed rail will give businesses around the state new opportunities to collaborate and to choose locations based on labor force availability. These improved connections will provide access to new job opportunities, generate new workforce development possibilities and create better jobs-housing balance throughout the state.

The Bay Area and the Silicon Valley drive much of the economic growth in California. The region is home to leading-edge global companies that lead the world in innovation. No region in America or the world has had so many startup companies grow so quickly into global enterprises of enormous influence. Similarly, the Los Angeles Basin is the global hub of the media and entertainment industry as well as a tourism and finance. However, these prosperous regions are also struggling to provide adequate affordable housing and the state's leaders have put a high priority on policies to address those challenges.

The Central Valley economy is growing and diversifying but still is lacking high-growth, high-wage, knowledge-industry sector jobs despite the burgeoning STEM talent in its cities. Bakersfield, Fresno and Merced, remain geographically isolated from the rest of the state which has stymied community leaders' efforts to accelerate efforts to attract more businesses and diversify their economies.

High-speed rail will break through those geographic barriers and create critical linkages between the Central Valley and larger, more diverse economies in the Bay Area and the Los Angeles Basin. Central Valley residents will have access to a

larger pool of job opportunities across all sectors. At the same time, high-speed rail will create an incentive for large, prosperous companies in the coastal cities to locate branch offices and back-office functions in the more affordable Central Valley. Fast, electrified high-speed rail will enable people to work at high-tech jobs while having access to more affordable housing options.

As the state becomes more tightly linked with high-speed rail, businesses up and down the state will have a new means of connecting with each other, their employees and the state's colleges and universities, creating more opportunities to collaborate, innovate and create—which is fundamental for sustaining economic prosperity while creating more economic opportunity for all Californians.

"...to provide Californians a safe, convenient, affordable, and reliable alternative to driving and high gas prices; while reducing air pollution, global warming greenhouse gases, and our dependence on foreign oil, to establish a clean, efficient high-speed train service linking Southern California, the Sacramento/San Joaquin Valley, and the San Francisco Bay Area."

— *Proposition 1A*

Regions Rise Together - A Partnership to Lift Every Region.

In May 2019, Lenny Mendonca, the Governor's Chief Economic and Business Advisor and Chairman of the California High-Speed Rail Authority's Board of Directors, announced the Regions Rise Together initiative. The goal is to develop an inclusive and comprehensive economic plan to lead sustainable regional economic development, according to a statement from the Governor's Office of Business and Economic Development (GO-Biz).

The effort builds on locally-driven initiatives while leveraging the state's investments and policy priorities. Regions Rise Together is focused on helping California communities become more resilient in the face of climate transitioning to a low-carbon future.

GO-Biz is actively collaborating with California Forward to develop and implement Regions Rise Together. California Forward is a non-profit organization that advocates for shared prosperity throughout the state by hosting annual economic summits. Last November, GO-Biz and California Forward convened the 2019 California Economic Summit in Fresno. The summit featured statewide leaders, such as Governor Gavin Newsom and state legislators, as well as Central Valley advocates, such as Fresno Mayor Lee Brand.



Photo: Governor Gavin Newsom at the 2019 California Economic Summit

ECONOMIC IMPACT OF HIGH-SPEED RAIL

Designing, planning and building the nation's first high-speed rail system has already yielded billions of dollars in economic benefits across the state, including job creation, small business opportunities and wider economic impacts spread throughout California. For more than 10 years, high-speed rail contractors have hired workers across the state and paid businesses for goods and services. Those firms, in turn, have hired employees and purchased materials necessary to

make their products. Workers spent their earnings throughout the economy on housing, food and other purchases.

We have invested more than \$5.7 billion in planning and building high-speed rail infrastructure between July 2006 and June 2019. As shown on **Exhibit 1.6**, this investment has rippled through California's economy, creating 44,700 to 50,500 job-years of employment and \$3.17 billion to \$3.62 billion in labor income, while generating \$8.3 to \$9.2 billion in total economic output.

What is a Job-Year?

Job-years represent a combination of total jobs and the length of time of those jobs. For example, one job supported for two years equals two job-years; five jobs supported for one year equals five job-years.

Exhibit 1.6: Economic Impact of High-Speed Rail Investments (July 2006 to June 2019)



Photo: Road 27 Safety Meeting

Exhibit 1.7 shows how this investment has created opportunities for disadvantaged businesses, disadvantaged workers and others in California. Cap-and-Trade funds invested in high-speed rail have and will achieve the statutory objectives of that program. Not only are we building a transportation system that will significantly reduce greenhouse gas emissions for decades to come, the Cap-and-Trade funds will expand considerable economic development and job creation in some of the state’s most disadvantaged communities.

As construction continues to expand, the economic benefits will continue grow. This will lead to new connectivity and business to business interactions that will drive California’s economy,

creating enormous benefits throughout the state. As we contract with new companies and those firms hire workers, advancement of the program will further bolster a new high-speed rail industry in California. Our initial economic analysis of the completion of the Silicon Valley to Central Valley Line and the Phase 1 System shows:

- Silicon Valley to Central Valley Line is projected to create 222,000 job-years of employment, \$17 billion in labor income and nearly \$50 billion in economic output; and the
- Phase 1 System is projected to create 624,000 job-years of employment, \$46 billion in labor income and nearly \$131 billion in economic output.

Exhibit 1.7: Creating Opportunities for Disadvantaged Workers and Fostering Diversity



Note: 1. To Oct. 31, 2018. 2. As defined by CalEnviroScreen. 3. As defined in Article 3.0 of the "General Management to Community Benefits Policy-National Targeted Hiring Initiative Plan" for CHSRA. 4. July 2006 - June 2019. 5. As of July 31, 2019.

■ DELIVERING THE VISION

Over the course of the last decade or so, California policymakers have assumed the mantle of leadership when it comes to reducing the adverse impacts of climate change. California has implemented a deliberate set of policies to reduce GHG emissions, and it has backed up those policies with funding dedicated to the cause.

More than 40 percent of GHG emissions in this state emanate from the transportation sector.³ California policy makers have enacted legislation, pursued policies and identified funding to reduce these emissions. At the heart of that effort is a commitment to move the transportation sector from one wholly reliant on fossil fuels to one that is increasingly moving toward electrification—of cars, buses, trucks public transit and passenger rail. This policy march will enable the state to meet its objectives when it comes to mobility, environmental and economic outcomes.

Electrified high-speed rail connecting the Bay Area, the Central Valley and Southern California is at the very heart of this effort. Substantial progress is being made; the transformation is well underway. Now is not the time turn back, not in any region of the state.

"California is facing a housing crisis and a climate crisis. It doesn't have to be this way. An essential part of solving these challenges is to invest in high-speed passenger rail connections between our cities and regions, and to add new housing and jobs around new stations so that all people can thrive."

— *Alicia John-Baptiste*

President & CEO

San Francisco Bay Area

Planning and Urban Research Association



ALTERNATIVES DEVELOPMENT

- Public workshop range of alternatives
- Evaluated in Preliminary Alternatives Analysis (2011)

STATE DEPARTMENT OF TRANSPORTATION

Photo: California High-Speed Rail Board meeting

ORGANIZATIONAL REFORM AND PROJECT PROGRESS

Our focus has been on priorities and progress over the last two years, and our efforts targeted internal and external aspects of the program. We have accomplished the things that we said we were going to do to improve our effectiveness.

We continued the work we began in 2018 to build an organization focused on performance and delivery. This started from the top down, with important appointments to our Board of Directors and senior staff leadership. We launched a thorough organizational review, with an emphasis on enhancing contract-management staffing and clarifying consultant and State roles. We increased transparency through detailed reporting to the Board of Directors and the Finance and Audit Committee, and through posting change orders on our website. We adopted a cost and schedule Program Baseline and implemented more rigor in critical decision-making through establishing a stringent governance process.

We have made significant progress on several environmental issues. The Federal Railroad Administration (FRA) approved our application for National Environmental Policy Act (NEPA) Assignment, making California the first state in the nation to receive approval for a rail project. We are committed to successfully implementing this new authority.

We are also moving forward on completing environmental documents for the Phase 1 system. Our Board identified preferred alternatives

CHAPTER 2

for all remaining Phase 1 project sections. We completed the environmental Record of Decision (ROD) for the extension to Bakersfield, the first ROD certification achieved with our new federal environmental authority. In less than a year, we expect to complete the next ROD certification for the Central Valley Wye.

On the construction front, we made important progress in the Central Valley. We resolved past litigation to allow construction work to progress more effectively. We resolved contractor issues to clear areas of construction and re-baselined construction schedules, steps that doubled the expenditure rate over the last year. We increased the number of active construction sites. We put thousands of workers on the job and engaged hundreds of small businesses. We completed third-party agreements and built stronger relationships with key stakeholders through resolving program-related issues. Finally, we released our first major operations infrastructure Request for Proposals (RFP), which covers Track and Systems. This is a necessary step to meet our federal funding

agreement requirements and constructing the nation's first truly high-speed rail system in America.

ORGANIZATIONAL CHANGES

Over the last two years, the Authority has experienced significant leadership change. This has included new appointments to the Authority's Board of Directors, as well as new executive leadership. The change in leadership has led to significant change within the Authority. These actions are part of an organizational realignment that began two years ago with new leadership—and these changes are having a positive impact.

NEW BOARDMEMBERS

Since the beginning of last year, four new members have been appointed to the Authority's Board of Directors, and the Board elected a new Chair.

Lenny Mendonca: On February 12, 2019, Governor Newsom appointed Lenny Mendonca, who currently serves as Governor Newsom's Chief Economic and Business Advisor and is the Director of the Governor's Office of Business and Economic Development (GO-Biz), to the Board. He was elected as Chair by the Board. He is a Senior Partner

Emeritus of McKinsey & Company and a lecturer on inequality at the Stanford Business School.

James Ghielmetti: Governor Newsom also appointed James Ghielmetti to the Board on October 10, 2019. Ghielmetti focused on local transportation issues by chairing the Transportation Committee of the Tri-Valley Business Council, serving on the Alameda County Transportation Authority Expenditure Plan Development Committee, and the Solutions on Sunol Coalition Leadership. He also served 16 years on the California Transportation Commission through three gubernatorial administrations.

Henry Perea, Sr.: On August 22, 2019, the California Senate President Pro Tempore, Toni Atkins appointed Henry Perea, Sr., to serve on the Board. In 2008, Perea was elected to the Fresno County Board of Supervisors. He also served on the Fresno City Council and on the Fresno County Board of Education.

Martha Escutia: On January 28, 2020, former State Senator Martha Escutia was appointed to serve on the Board by Assembly Speaker, Anthony Rendon. Escutia, a former California State Senator and Assembly member, is currently the Vice President of Government Relations at the University of Southern California.



Photo: California High-Speed Rail Board Meeting

EXECUTIVE TEAM APPOINTMENTS

In 2018, CEO Brian Kelly was appointed by the Board of Directors, and two key leadership positions, a Chief Operating Officer and a Chief Deputy Director, were added to the Authority's organizational structure. Since, there has been a strategic effort to form and align an executive management team around progress and delivery.

"New leadership, new transparency on the High-Speed Rail Authority, new accountability and expectation, certainly from me, that this is not an ideological endeavor. It's a very pragmatic endeavor and we're going to drive it."

— Governor Gavin Newsom

In 2019, Governor Newsom appointed several people to key executive leadership positions, including the:

- Chief Financial Officer;
- Chief of Strategic Communications;
- Chief Counsel;
- Director of Engineering;
- Director of Planning and Sustainability;
- Director of Real Property; and the
- Director of Legislation.

FORM TO FUNCTION

The Authority's Board of Directors and executive management recognize the importance of a strong management structure and proper staffing to ensure the successful delivery of an electrified high-speed rail system. To that end, and under the Executive leadership, the Authority undertook a

strategic review of its organizational structure to properly align both State and consultant resources for functions and roles.

To achieve this objective, the executive and senior management conducted comprehensive reviews of organizational structures and duties, held multiple rounds of interviews with each office, and ultimately proposed realignment of certain functions and staffing. This included addressing a key 2018 audit recommendations to augment State oversight roles and replace consultants with State staff where appropriate.

The proposed changes will lead to a more robust, stronger governance structure and State oversight of key areas of the organization while maintaining consultants in more appropriate roles and functions. The Authority will work with the Department of Finance and the Legislature to make any budget changes needed to implement the form-to-function review.

PERFORMANCE IMPROVEMENT

The 2018 Business Plan identified a series of lessons-learned and actions we would be taking as we move forward. Since its publication we have worked diligently and prudently to evolve our program and project execution. It is important to note the differences between the work done related to program execution from those related to the individual projects that are underway. Our program work has looked at the related projects and actions that when coordinated build a long-term strategy for the initiation of electrified, high-speed rail passenger service. Our project execution has centered on managing the related events to focus staffing and financial resources towards the specific, transitory task achievement.

This evolution has taken many forms and facets and has transformed every major aspect of the organization. It has given the organizational cohesion, tenacity and rigor to achieve a single purpose—building America’s first high-speed rail system.

Our work has completed the transformation from a planning to a delivery organization now focused on a development to delivery approach. It is critical to understand that successful delivery is a predecessor activity to the successful implementation of future phases of program development—leading to a public stewardship of resources and greater transparency.

Key program elements that have changed the way we do business have included:

- **Development of an annual Board-approved Program Baseline:** This key document authorizes projects and expenditures to be performed related to a specific integrated set of projects;
- **Identification of an integrated set of projects and schedules:** These projects are logically linked to optimize their respective completion, assigning budget and resources to their completion;
- **Budget and resource allocation:** This work identified and allocated the resources necessary to complete project activities and actions for the completion of those projects;
- **Development of Key Performance Indicators (KPI):** This provides the management tool to monitor individual project and contractor delivery progress;
- **Governance and decision-making:** The application of the governance changes identified in 2018 has led to greater organizational focus and coordination and

progressive decision making. This resulted in an updated delegation of authority approved by the Board;

- **Updated Program Management Plan:** The application and refinement of program management plan roles and responsibilities has focused accountability and attention to budget and schedule delivery. Staff are focused on those deliverables and actions that are defined by the Program Baseline; and
- **Reporting:** A series of internal and external reports on performance objectives has brought greater performance visibility and public transparency.

We have also taken the development to delivery approach to project management as well. This has evolved through a building-block approach originating with initial project planning and design and carried through acquisition, procurement and ultimately into contract execution and oversight. Key elements of this have included:

- **A commitment to configuration management:** Taking the environmental Record of Decision (ROD)/Notice Of Determination (NOD) achievement that defines the general alignment, scope and environmental characteristics allowing for cost range development;
- **Advancing work to construction:** Defining the foundational planning and engineering for procurement to define specific project requirements and identifying opportunities of optimization to develop a cost estimate for construction. This work defines right of way, first-order utility work and third-party agreements, and establishes environmental permits in advance of contract acquisition. This reduces risks of

delay and defines required project elements to better assess contractor proposed designs;

- **Evolution of project and change control:** We have created a monthly discipline and structure to further understand project status. The award of the contract is straightforward and allows the contractor to immediately initiate project delivery with systematized State oversight. Project metrics to measure contractor and consultant performance have now been identified and are managed; and
- **Refined change management policies and procedures:** An updated Change Management Plan and contingency allocation decision-making provided the framework and process to successfully manage project change. This included updated quarterly reporting to the Federal Railroad Administration (FRA) on contingency drawdowns to increase transparency on project expenditures.

PROCESS IMPROVEMENTS

Over the last two years, executive staff have strengthened project management skills and clarified roles and responsibilities through a comprehensive review process. These have further aligned State and consultant resources and have eliminated barriers impeding construction. Key activities have included:

- Eliminating the silos between functional and project delivery teams by creating integrated process review teams to streamline activities;
- Completing a "form to function" review of project delivery staff adjusting State and consultant contract oversight and aligning staff and contractors appropriately for performance and delivery;
- Reinforcing a commitment to governance through a bottom up approach on issue identification, recommendation development and appropriate approvals; and
- Creation of an enhanced project controls unit that reports monthly on construction targets.



Photo: Kansas Avenue Construction, April 2019

LEAN SIX SIGMA

We applied the Lean Six Sigma approach to many different aspects of the program. Lean Six Sigma is a well-established method used by large multinational corporations and U.S. federal agencies to improve performance. This structured, problem-solving approach has helped us refine and streamline internal processes and create cross-functional teams to eliminate barriers.

The Lean Six Sigma approach, identified in **Exhibit 2.0**, has been used to optimize:

- Right-of-way procurement and land conveyance processes for utilities;
- Construction master planning to re-baseline schedules; and
- Design engineering independent check engineer/independent site engineer processes.

Exhibit 2.0: Lean Six Sigma Approach



These changes have led to removing barriers to project delivery. With better understanding of roles and responsibilities and re-alignment of State and consultant staff, silos have been opened. Cross-

functional teams have been formed between functional and delivery staff to resolve critical issues. It has also led to the creation of delivery teams with new contractor and construction management leadership along with strengthened Authority contract management personnel. This has resulted in an effective dispute resolution and clearer communication between the Authority and contractors.

"The Authority has evolved into an agency focused on getting work done. In the face of challenging deadlines, we believe a strong partnership is necessary to advance the project accordingly. The Authority has become a strong partner by being able to develop and implement strategies to overcome challenges. We are making progress and together we can accomplish our collective mission together."

— Jose Luis Mendez,
President, Dragados USA
Construction Package 2-3 Contractor

These changes have refocused activities that have led to increased construction and expenditure rates compared to last year. This has helped to resolve third-party agreements and has led to improved partner relationships that has facilitated construction site access and availability.

Progress on key metrics are reviewed with the Board Finance and Audit Committee and Board of Directors on a monthly basis. This along with posting of contractor change orders on the Authority's web site provides greater transparency on program progress.

PROGRESS RESULTS

With these leadership changes and the work to build an organization focused on performance and delivery we are now seeing results.

ADVANCES IN EXPENDITURES

Since the second quarter of 2019, expenditures related to our three Central Valley design-build construction contracts (Construction Package 1 (CP 1), Construction Package 2-3 (CP 2-3) and Construction Package 4 (CP 4) have nearly doubled—increasing from an average of \$22 million per quarter to \$46 million per quarter as shown on **Exhibit 2.1**.

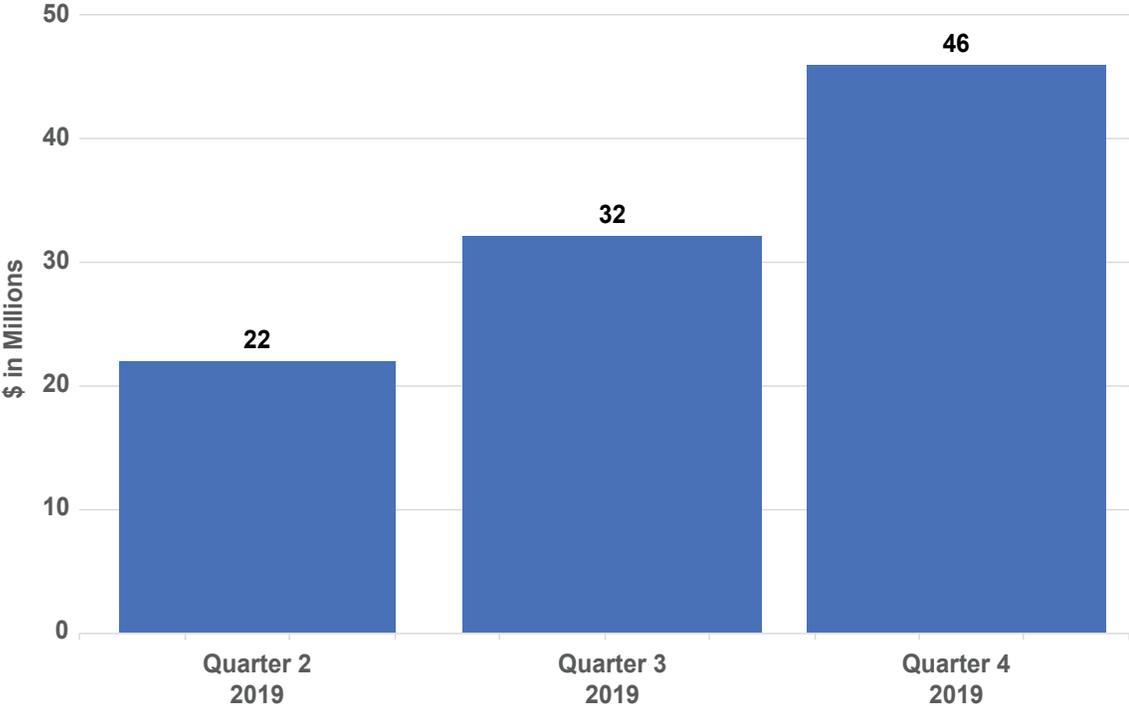
MORE SITES OPEN

Our focus remains on moving the needle on construction in the Central Valley. Executive leadership set out a construction expenditure plan

required to meet the December 31, 2022, federal grant deadline. In addition, cross-functional "Strike Teams" were created to clear project work sites and resolve commercial contractor charges and claims to increase construction productivity.

We are now active on 30 sites in the Central Valley. We have made important progress on strengthening our relationships with third parties, such as Union Pacific Railroad (UPRR), BNSF and utility companies, and this has allowed us to initiate several redesigns that will allow us to avoid right-of-way conflicts with third parties. In addition, we have thoroughly analyzed our right-of-way process to evaluate the necessity of every step and the risk associated with every step. We are working closely with legal counsel as we streamline our right-of-way processes. This behind-the-scenes work will allow us to open construction sites more quickly.

Exhibit 2.1: Design-Build Construction Packages - Average Quarterly Expenditures (\$ in Millions)



MORE WEEKLY WORKERS ON THE JOB

As we open more sites, we will get more workers into the field. As of the beginning of 2020, we had 600 onsite workers per week and that number continues to increase (**Exhibit 2.2**). We are now at more than 3,500 workers dispatched and 539 small businesses engaged in building bridges, viaducts, grade separations and other high-speed rail infrastructure.

With more workers and more sites under construction, we continue our oversight diligence of contractor attention to safety. We conducted nearly 6,000 safety observations in 2019 and more than 1,500 site-safety audits. This has resulted in a safety-incident rate well below the federal bureau of Labor Statistics rates for construction.

In addition to the construction oversight, the safety office has also progressed program improvements, including: safety program continuous improvement reviews, resulting in updates to the Safety and Security Management Plan; creating a policing committee with the California State Highway Patrol and developing a Security and Policing Strategy; ongoing review of construction engineering designs implementing FRA certification standards and processes; and working with environmental teams to review safety requirements for various environmental documents.

"High-Speed Rail's expansion in the Central Valley means thousands more men and women going to work building transportation infrastructure that will meet the needs of Californians for decades to come while earning a great living to raise their families with dignity and pride. It also means the Nation's first truly high-speed rail system gets built right here in California, exactly where it should be – home to innovation and opportunity."

*— Robbie Hunter
President, State Building and
Construction Trades Council*

Exhibit 2.2: Weekly Average Workers Dispatched



PROGRESS WITH DESIGN-BUILD CONTRACTORS

"It is our belief at the Tutor Perini sponsored Joint Venture currently building CP1 that the Authority's reorganization and commitment with the present level of talent has definitely turned the corner and has brought the project to a point where its completion is finally predictable and in front of us."

— Ron Tutor, CEO, Tutor-Perini,
Construction Package 1 Contractor

We have taken many steps to resolve issues that were impacting construction progress and to make the sustained progress that is required to deliver the federal grants requirements by December 2022. These include:

- Resolving all the delay claims through the middle of 2019 for all construction packages;
- Establishing a Strike Team to support the construction packages to expedite issues resolution that impact construction works.

This team includes subject matter experts and functional leads mobilized from the Sacramento office;

- Conducting weekly issue management meetings chaired by the Chief Operating Officer with the design-build contractors, construction package management, and functional leads to drive issues resolution and quick decision-making;
- Conducting weekly design coordination meetings to drive design completion and engineering solutions to clarify third-party, railroad and right-of-way requirements. This facilitates design readiness for construction;
- Prioritizing right of way and identifying critical parcels for utility and construction access; and
- Engaging with executive levels at Pacific Gas and Electric (PG&E), UPRR, BNSF and California Department of Fish and Wildlife to escalate and resolve issues quickly.

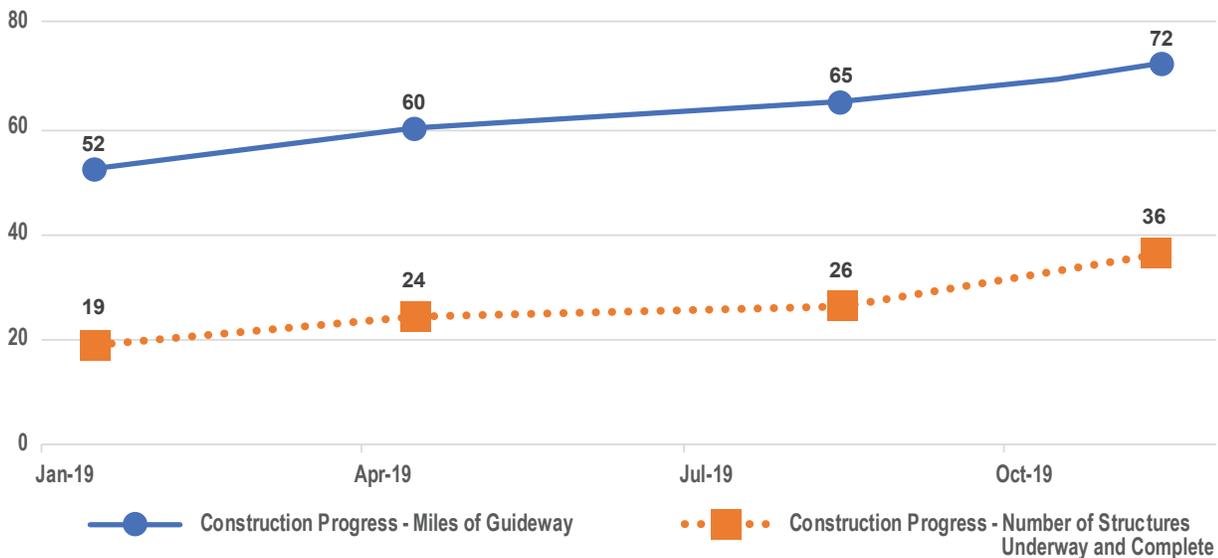
CLEARING THE WAY FOR CONSTRUCTION

Over the last year staff have created a series of tracking tools to oversee the status of key elements for construction. These are reviewed at monthly team confidence meetings to identify barriers to construction. This information is then summarized by an augmented Program Management Oversight team into a monthly Program Delivery Status Report that provides key performance metrics on key areas as well as on contract and consultant progress. Finally, key elements of these reviews are provided to the Board's Finance and Audit Committee.

Exhibit 2.3 shows the structure and guideway progress over the last year. Since January 2019, we have added 20 miles of guideway, increasing the number of miles underway to 72 miles and the number of structures completed or underway has almost doubled, from 19 to 36.

"Permitting large and bold infrastructure projects can create many challenges for different agencies to work through. Building partnerships is the best way to deal with projects like this one. Our departments' partnership with the Authority is good and getting better which is also good news for department's mission of fish and wildlife conservation."
 — Chuck Bonham, Director, California Department of Fish and Wildlife

Exhibit 2.3: Structure and Guideway Progress in 2019



In addition, staff are working to complete third-party agreements to define the work that is necessary to address impacts along the high-speed rail alignment. The other area staff is working closely with the contractors in on right-of-way necessary for construction.

THIRD-PARTY AGREEMENTS

While gaining a greater understanding of the construction barriers and outstanding contractor concerns, staff worked to build stronger relationships with third-party partners. As that work was underway, staff worked to prioritize the outstanding agreements necessary for construction. Over the last year, we signed 35 agreements/amendments around 11 aspects of construction, including the following types of agreements: master/cooperative; reimbursement; operations and maintenance; right-of-way transfer; utility; interagency; encroachment permit; license; and permits to enter.

Another significant area included the completion of railroad agreements to clear construction sites adjacent to freight and passenger operating lines. These agreements ensure safe operation of these active lines while high-speed rail construction crews are near. In addition, design advancement has identified temporary relocations (called a shoofly) and utility and irrigation crossings to be constructed.

This work has made great strides in improving our working relationships and field coordination with UPRR. Direct discussions, schedule coordination and improved deliverable quality and reliability have all aided in moving our work forward. As a result, UPRR has now provided additional refinements to its review, approval and oversight processes, including:

- Increased utility submittal rate to 10 per week, allowing us to clear our design backlog;
- Conducted special design review closure meetings, allowing us to finalize the Downtown Shoofly to be followed by the West Side Shoofly in Fresno;
- Improved priority list reviews to less than 10 working days, moving CP 1 construction forward;
- Greater employee engagement at weekly resolution meetings, resulting in completion of submittals and requests for information; and
- Led to a successful reopening of Mono Street in downtown Fresno only possible through close coordination between UPRR, Fresno, the CP 1 Project and Construction Management services (PCMs) and design-build (DB) contractor, and San Joaquin Valley Rail.

RIGHT OF WAY

Staff has continued to work closely with the design-build teams to define a schedule for the remaining parcels to be acquired. This work resulted in re-baselined schedules with each design-build contractor. To meet these updated schedules, we have taken the following actions to improve our work flow:

- Convening multidisciplinary, right-of-way workshops with acquisition staff, design-build teams and project construction management firms to confirm parcel needs and status;
- Streamlining the pre-acquisition and utility land conveyance processes through a Lean Six Sigma review;

- Continuing to pursue acquisition strategies for critical parcels to reduce schedule delays;
- Consolidating acquisitions affecting related parcels; and
- Additional staffing to oversee and expedite the process, including:
 - Added staff focused on utility land conveyance critical for utility work;
 - Added Caltrans leadership knowledgeable in the acquisition process; and
 - Additional consultant oversight for contract coordination and schedule management.

Using the Lean Six Sigma process, as well as the legislative authorization in 2018, resulted in significant delivery improvements. We have reduced the time necessary for land conveyance by 100 days and the pre-acquisition process by 40 days. Our work has also resulted in developing new approaches to aggregating parcels to consolidate acquisitions.

"We are seeing tremendous progress on the ground, and I am confident that working together we can get the work done on time."

*— Jose Baraja, Regional Director,
Ferrovial Agroman US Corporation,
Construction Package 4 Contractor*

GOAL: MEET OUR FEDERAL COMMITMENTS

The Central Valley was selected by the federal government to receive American Recovery and Reinvestment Act (ARRA) funds in 2009 to begin high-speed rail construction. In its October 2010 selection notification letter, the FRA noted that applications were subject to many evaluation criteria, including a project's ability to meet broad program objectives and strategic transportation goals including Economic Recovery Benefits (including job creation) and Environmental Benefits. The Authority and the FRA jointly agreed that construction in the Central Valley met these goals for several reasons:

- The Central Valley suffered from one of the highest unemployment rates in the nation, reaching nearly 17 percent in 2010;
- The Central Valley has long experienced the negative effects of some of the worst air quality in the nation;
- This construction work provided immediate recession relief in one of the hardest hit areas of the country through design and construction employment. Today, the economic benefits that have been achieved are profound, and we remain committed to completing what has been started with these federal funds; and
- Development of a high-speed rail test track for high-speed rail trains, systems and technology.

ENVIRONMENTAL SCHEDULES

Over the last year, the environmental team has been working closely with the Central Valley contractors as designs are being completed. These refinements have required a continuous assessment of how these designs affect original environmental reviews. We completed 23 environmental re-examinations related to new right-of-way acquisition and other project design changes on the 119-mile section. These changes have also resulted in 20 permit amendments with oversight environmental agencies that are complete, including a new mitigation contract for the Hairy Orcutt Grass in CP 1.

In addition to oversight of completed environmental documents, staff are driving to complete all documents for the Phase 1 system. This work is an important prerequisite to extending the system and pursuing additional funding for system expansion in Northern and Southern California. Completion of this work will meet our federal commitment for Records of Decision on the Phase 1 system by the December 2022 ARRA deadline.

In November 2019, under our new National Environmental Policy Act (NEPA) Assignment authority, we issued the ROD for the segment between Shafter and Bakersfield in the Central Valley (known as the Locally Generated Alternative). This completes the environmental review process between Fresno and Bakersfield and allows us to begin pre-construction activities such as right-of-way acquisition, third-party agreements and utility relocation activities—incorporating and following lessons learned from early construction on our initial three design-build construction contracts. This was the first environmental action taken under the California’s newly granted National Environmental Policy Act NEPA assignment.

The route, known as the Locally Generated Alternative, extends from Poplar Avenue east toward State Route 99 then southward into Bakersfield, ending at the F Street Station in downtown Bakersfield. This route was developed collaboratively with state, regional and local partners. On the way to finalizing the ROD, we held more than 100 stakeholder meetings, 17 additional public and technical working group meetings, and 15 monthly regulatory agency coordination meetings.

In 2020 we anticipate issuing a ROD for the Final Supplemental Merced to Fresno Environmental Impact Report (EIR)/Environmental Impact Statement (EIS). This will complete the analysis of the Central Valley Wye that provides the junction allowing trains to travel north-south between Southern California and Merced, between Southern California northwest to San Francisco, and between Merced and San Francisco. The ROD is scheduled to be issued in fall 2020. With the completion of this document, we will be prepared to initiate early pre-construction activities like the Bakersfield extension.

We have also been making significant strides on the remaining environmental documents. With the selection of preferred alternatives, we have distributed four of the remaining six environmental documents for federal cooperating agency review, completing the review on the Bakersfield to Palmdale documents. Within the next year we expect to release draft environmental documents for the final six project sections for public review and comment. Two of the sections are in Northern California between San Francisco and Merced and four are in Southern California between Bakersfield and Anaheim.

Table 2.0: Projected Environmental Schedules

Project Segment	Draft EIR/EIS	Revised ROD Date
Locally Generated Alternative (Fresno to Bakersfield)	Completed	Completed
Central Valley Wye (Merced to Fresno)	Completed	September 2020
Bakersfield to Palmdale	March 2020	April 2021
San José to Merced	April 2020	May 2021
Burbank to Los Angeles	May 2020	June 2021
San Francisco to San José	June 2020	August 2021
Palmdale to Burbank	December 2020	January 2022
Los Angeles to Anaheim	January 2021	February 2022

Table 2.0 summarizes the schedule for these remaining six project sections and shows when the final EIR/EIS documents and RODs are scheduled to be complete.

LITIGATION SETTLED

In August 2019, we settled the final environmental legal challenge associated with the 119-mile project under construction. Kings County filed a lawsuit against the Authority in 2014 under the California Environmental Quality Act (CEQA) on the Fresno to Bakersfield environmental document. The lawsuit cited concerns with the certification of the agency's Final EIR/EIS on high-speed rail's impact to communities along that segment. The settlement removed the final litigation hurdle, and we are moving forward collaboratively with the county on construction. Further, we signed cooperative agreements with the county related to coordination of construction efforts and the maintenance of grade separations.

FINISHING 119 MILES OF CIVIL AND TRACK CONSTRUCTION

Exhibit 2.4 on pages 44 and 45, shows the current limits of construction for this first 119 miles and photos of the latest construction progress. For more information on construction activities and progress, see Build HSR website at:

<https://www.buildhsr.com>.

With the progress made above, we continue to advance work to complete the 119 miles of high-speed rail infrastructure in the Central Valley from Madera to Poplar Avenue. Building this line is a critical piece of meeting the December 2022 federal grant capital construction deadline and will set the stage to begin high-speed rail testing. The current construction work includes 119 miles of guideways and structures that separate future high-speed trains from roads, highways and railroads.

The project delivery and capital construction work underway includes five major projects; three design-build construction packages, the Caltrans realignment of State Route 99 (SR-99); and the installation of track.

The SR-99 realignment work was completed in January 2019. This shifted the highway 100 feet to the west, reconstructing three overpasses, adding auxiliary lanes and improved ramp access for traffic safety and mobility.

In Construction Package 1, we completed the Avenue 11 and Avenue 8 overpasses, installed the San Joaquin Viaduct arches. In addition, significant progress has also been made on Avenues 7, 10, 12 and 15, the Fresno Trench box under State Route 180 (SR-180), and the Cedar Viaduct over SR-99.

In Construction Package 2-3, we executed an agreement with Kings County that has resolved outstanding issues that has expanded construction. Work is underway at 14 sites through Fresno, Kings and Tulare counties. This section also has the most guideway completed with approximately 50 miles constructed.

In Construction Package 4, we began work on the Garces Highway, Poso Creek, Pond Road, Merced Avenue, and the significant Wasco Viaduct and pergola structure. The viaduct, which is the largest structure in this segment, includes the largest utility relocation on the project (Level 3 fiber optics through Wasco). Construction in the Central Valley is increasing based on our work to resolve outstanding pre-construction issues. Staff is working with third parties and the design-build teams to finalize and prioritize remaining right-of-way acquisitions. By early 2021, all pre-construction work is expected to be complete so structure and guideway construction can fully advance. We plan to complete most of the guideway including structures supporting high-speed rail infrastructure by the end of 2021. This will allow access for the Track and Systems contractor to complete track installation by 2022. Remaining automobile overpasses will also be completed by the end of 2022.

Veterans Boulevard Interchange and Corridor Improvement Project:

This project is a comprehensive, multimodal improvement that includes construction of a new six-lane arterial roadway, an interchange with SR-99, grade separations over Union Pacific Railroad and California high-speed rail tracks, and the realigned Golden State Boulevard. It also includes a pedestrian trail and improvements to adjacent roadways.

The Authority contributed \$28 million for Phase 1 and 2 of this \$138.5 million project. This contribution, plus local funding and the City of Fresno's recent receipt of a 2019 U.S. Department Of Transportation BUILD grant award for \$10.5 million fully funds the project.



Exhibit 2.4: Progress Photos for CP 1, CP 2-3, and CP 4 (Two-page Spread)





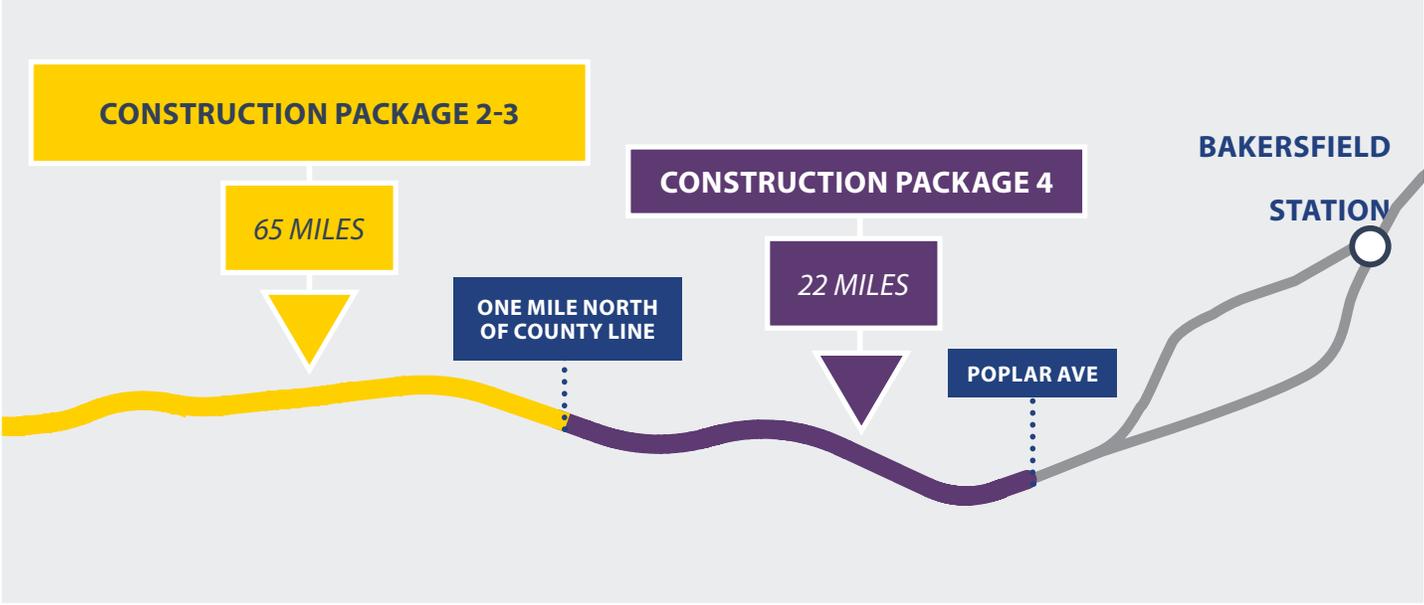
CP 2-3 KANSAS AVENUE



CP 2-3 KANSAS AVENUE



CP 4 WASCO VIADUCT



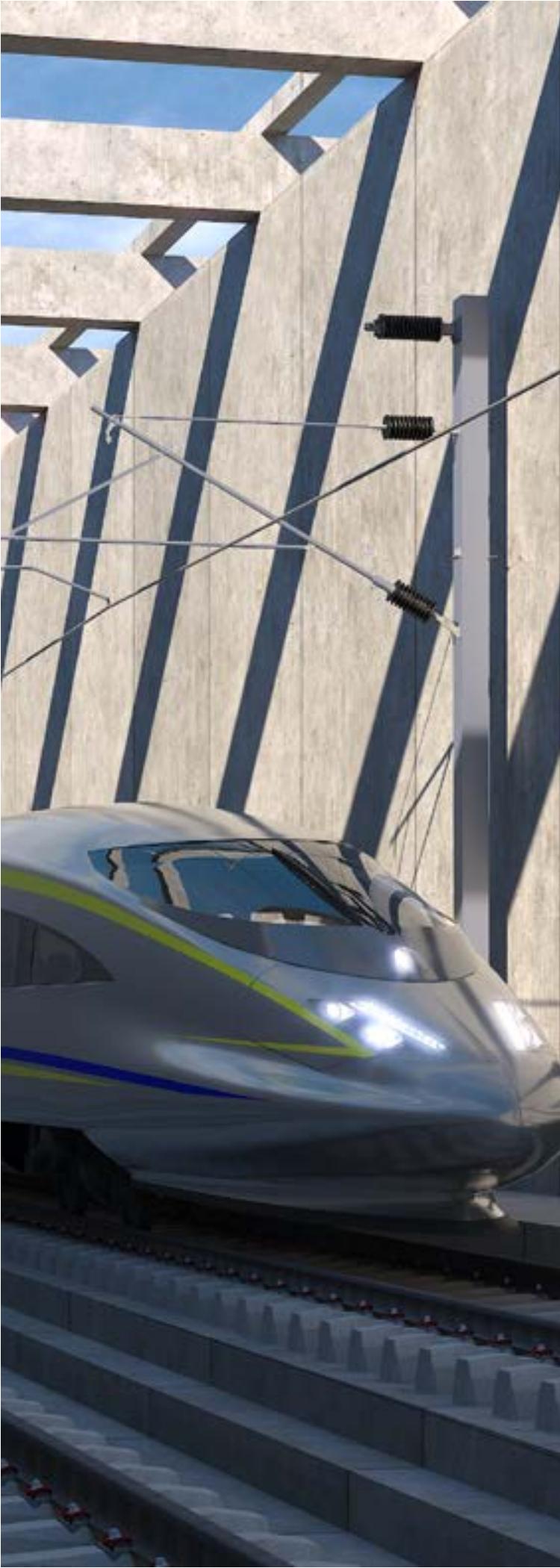
CP 2-3 EXCELSIOR AVENUE



CP 4 GARCES VIADUCT



CP 4 WASCO VIADUCT



TRACK AND SYSTEMS

We released the Track and Systems request for proposals in December 2019. Three joint-venture firms were previously shortlisted to complete proposals:

- Bombardier-Salcef-Weitz Consortium;
- California High-Speed Rail Constructors (Balfour Beatty, Fluor Enterprises); and
- H-A-C Rail Partners (Hitachi, Acciona, Copasa).

Proposals are due June 2020 with Board action anticipated in fall 2020. The first step will be to complete the design and then begin installing track on the first 119 miles in the Central Valley between Madera and Poplar Avenue in 2021, with completion by December 2022.

The procurement strategy developed provides flexibility and allows delivery in a phased manner designed to ensure seamless integration as new civil construction is completed. The scope of work allows for a single provider to design, integrate, construct and maintain for 30 years the critical interfaces between the train, the signal system and power system. Prior to the installation of track, the contractor will design all the key under track cable and power connections to substations and communication towers. This contractor ensures that cross trenches and conduit for these elements are in the proper location prior to installing the track.

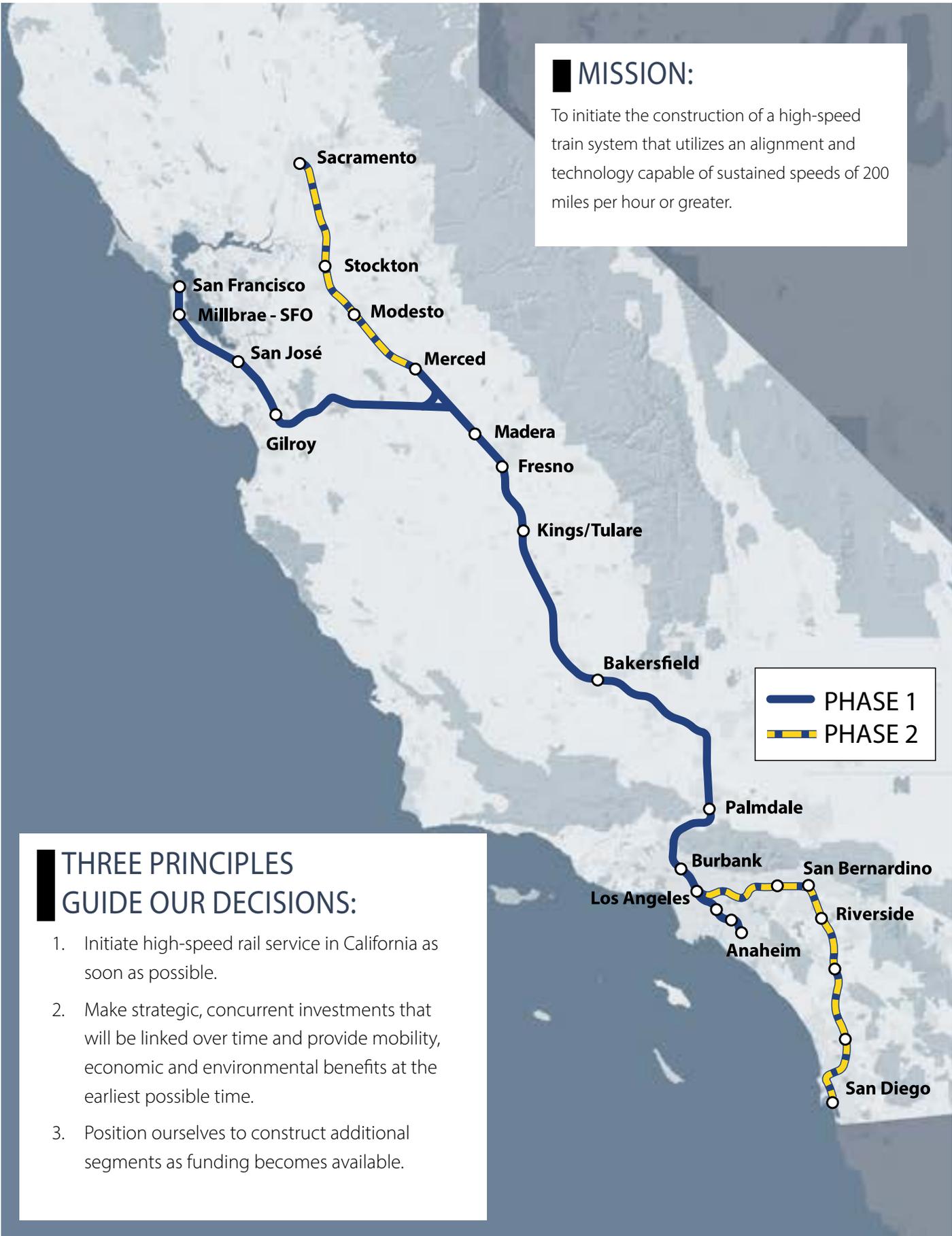
The other critical interface this contractor will be responsible for includes connections between the track and overhead power (catenary) lines to the rail vehicle. They will need to work closely with the train manufacturer to ensure that these elements can meet required tolerances for high-speed rail operations.

■ ADVANCEMENTS IN 2020

In the 2018 Business Plan, we laid out steps we would pursue in delivering the Silicon Valley to Central Valley line. Since then, we have continued to evaluate and refine that approach. We completed the additional analysis to inform our recommendation on extending current Central Valley construction to Bakersfield and Merced. This was done with an eye on the anticipated amount of available funding and how those investments would link in the interim to the existing state rail network. This analysis is discussed in Chapter 3. Based on this additional analysis, we still recommend that we remain on the path we set in 2018 and refined last year in the Project Update Report—complete the commitments that have already been made to the Central Valley and other partners and strategically build on those investments incrementally as funding is available.

Our next steps are clear for 2020, continue to advance construction in the Central Valley and complete the remaining Phase 1 environmental documents by December 2022 to meet our federal grant commitments. We will award our first major contract since 2016 for Track and Systems, and we will focus on preparing segments of guideway for track installation. By January 2021, we expect that all draft environmental documents will be complete. The result will be communities all along the high-speed rail corridor will be actively engaged and seeing progress.

With these advancements and the progress listed above, we are ready to begin the next phases of pre-construction work on the Bakersfield extension and the Merced extension by this Fall when the environmental ROD is completed. With the support of the Early Train Operator, we will begin the operational planning work necessary to be ready to begin high-speed rail infrastructure and trainset testing.



MISSION:
 To initiate the construction of a high-speed train system that utilizes an alignment and technology capable of sustained speeds of 200 miles per hour or greater.

— PHASE 1
 - - PHASE 2

THREE PRINCIPLES GUIDE OUR DECISIONS:

1. Initiate high-speed rail service in California as soon as possible.
2. Make strategic, concurrent investments that will be linked over time and provide mobility, economic and environmental benefits at the earliest possible time.
3. Position ourselves to construct additional segments as funding becomes available.

THE TRANSFORMATION IS HAPPENING STATEWIDE

As we have made clear in prior business plans and reiterate here, this program has never had all the funding it needs to build the entire Phase 1 system from San Francisco to Los Angeles/Anaheim. In 2008, the voters approved the issuance of \$9 billion in bonds for a high-speed rail program estimated to cost \$45 billion, providing just 20 percent of then-estimated program costs. Since then, we have been successful in matching bond funds with federal funds, other state funds, local funds, and we are now witnessing the emergence of private sector interest in constructing and operating electrified high-speed rail in California.

Because we are progressing in a constrained funding environment, the Authority has adopted three principles to guide our decisions on how we would invest the funds we have available to build the project and to expand the system over time. We are guided by our mission articulated in the law and these three guiding principles.

We estimate considerable funding available for high-speed rail between now and 2030, funds that are dedicated to our mission and that will enable us to achieve all of the following:

- Complete construction on the 119-mile Central Valley Segment and lay track pursuant to the requirements in our federal funding grant agreements with the Federal Railroad Administration (FRA);

CHAPTER 3

- Environmentally clear the Phase 1 system between San Francisco and Los Angeles/Anaheim within the next 18 to 24 months;
- Complete construction on the "bookend" projects we have committed funding to in Los Angeles and the Bay Area—projects valued at more than \$3 billion;
- Expand the 119-mile segment in the Central Valley to 171 miles of electrified high-speed rail connecting Merced, Fresno and Bakersfield, one of the fastest growing regions in California, with additional stops to serve Madera and Kings/Tulare;
- Commence testing of electrified high-speed trains by 2025 and put electrified high-speed trains in service by 2028-29; and
- Pursue federal and private funds prospectively to "close the gaps" and expand electrified high-speed rail service to the Bay Area and Los Angeles/Anaheim, completing the Phase 1 system approved by the voters in 2008.



Rendering: San Joaquin River Viaduct

With these steps, in the next 18-24 months we will advance our mission and see 350 miles of electrified high-speed rail under construction in California and the entire Phase 1 system between San Francisco and Los Angeles/Anaheim environmentally cleared.

We will set the stage now for electrified high-speed rail being tested, certified and operated in California this decade. Importantly, we will keep our commitments to the communities and the people of the Central Valley to provide clean, fast, electrified high-speed rail and to build system facilities with long-term economic development and permanent job creation in the Central Valley. We will meet our commitment to the federal government to construct the nation's first true high-speed rail system. Moreover, we will position ourselves to focus new funding on implementing a "close the gaps" strategy to connect the Central Valley with the Bay Area and Southern California.

This chapter lays out our strategy to advance electrified high-speed rail pursuant to the direction the voters of this state gave us. It describes our proposal to expand on the work underway in the Central Valley to connect three major Valley cities—Merced, Fresno and Bakersfield. This 171-mile line will represent the first building block of the first true high-speed rail system in the nation.

We also summarize the results of two due diligence analyses, directed by the Authority's Board of Directors, conducted by the Early Train Operator (ETO), DB Engineering & Consulting USA, and our financial advisor, KPMG. The results of their work collectively affirm our May 2019 recommendation to develop high-speed train service connecting Bakersfield, Fresno and Merced, with important connections to traditional rail services in the north to the Bay Area and Sacramento, and south to expanded bus services into the Los Angeles Basin.

Finally, we describe important advancements we are making outside of the Central Valley, in both the Bay Area and Southern California. By advancing all this work, we move toward electrified high-speed rail operating in California and we focus our future funding strategy on "closing the gaps" between the Central Valley and the Bay Area and Los Angeles/Anaheim.

"The approach adopted by the [Authority] - what we could call "the building block approach" is very similar to the one used in Spain that has ultimately led to the development of the largest high-speed rail network in Europe, second largest high-speed rail network in the world after China."

*— Xiana Margarida Mendez Bertolo,
Secretary of State for Trade, Ministry of Industry,
Trade and Tourism, Spanish Government*

EXPANDING NORTH TO MERCED AND SOUTH TO BAKERSFIELD

Our 2018 Business Plan introduced the concept of initiating early high-speed passenger service in the Central Valley—service that could be delivered with existing committed funding—as a first building block toward the Silicon Valley to Central Valley Line. Consistent with our principle for investing our available funds, we tasked the ETO with studying the potential ridership, revenue and operation of an interim service on two different lines, one between Merced and Bakersfield in the Central Valley and the other between San Francisco's 4th and King Station and Gilroy on the Peninsula.

The ETO's review, summarized in our 2019 Project Update report, concluded that there would be "significant value in interim high-speed rail services" between Merced and Bakersfield when connected to the existing state passenger rail network. This spine would connect seamlessly at Merced to existing passenger services north to Sacramento and east to the Bay Area via the San Joaquins and Altamont Corridor Express (ACE); and south at Bakersfield to existing San Joaquins Thruway Bus connections into the Los Angeles Basin. The ETO's study showed that electrified high-speed rail service on dedicated tracks would significantly reduce travel times through the Central Valley, allow for faster and more frequent service, generate significantly higher ridership, reduce the state's passenger rail subsidy requirements and reduce greenhouse gas (GHG) emissions.

Based on the ETO's conclusions, we made a policy recommendation in our 2019 Project Update Report to use the remaining \$4.8 billion in available funding, beyond the \$15.6 billion associated with meeting our federal and regional commitments, to complete the 171-mile line connecting Merced to Bakersfield.

After the release of our 2019 Project Update Report, the Board of Directors requested that two additional studies be performed to provide additional due diligence for decisions related to adopting an expanded program baseline budget and schedule based on available funds. These studies included the:

- **Business Case Assessment Study:** The Board's Finance and Audit Committee requested that our financial advisor, KPMG, develop a Business Case Assessment Study for the proposed Merced to Bakersfield interim high-speed rail service. The study

evaluated a range of issues including funding and affordability, ridership and revenue forecasts, business model, commercial considerations, risk and mitigation strategy, and socio-economic and other benefits; and the

- **Side-by-Side Study, Quantitative Report:** The Board of Directors requested that the ETO prepare an expanded analysis comparing the Merced to Bakersfield investment recommendation to other comparable early investment options in the San Francisco to Gilroy corridor and the Burbank to Anaheim corridor. The Side-by-Side Study, Quantitative Report, evaluated a range of costs and benefits including capital and operating costs, ridership, GHG reductions and congestion relief.

Together, these two studies along with their recommendations affirm our proposal to invest the projected \$4.8 billion in the Merced to Bakersfield line.

KPMG BUSINESS CASE ASSESSMENT STUDY

KPMG's Business Case Assessment study concluded that allocating the Authority's remaining funding to Merced-Bakersfield allows the Authority to meet one of its key objectives—initiating high-speed rail service as soon as possible. The study presented 10 conclusions and five recommendations for the Authority's consideration regarding implementing Merced to Bakersfield interim service.

BUSINESS CASE - CONCLUSIONS

KPMG's conclusions are summarized in the box and discussed in more detail below:

1. Significant socio-economic benefits.
2. Enhanced mobility and multimodal hub created at Merced.
3. Interim service utilizes Authority infrastructure and train assets prior to completion of Silicon Valley to Central Valley.
4. Interim service reduces the State's costs for passenger rail operations in the corridor.
5. It is affordable under base case scenario.
6. Positive return on investment with Silicon Valley to Central Valley.
7. Interim service requires a new business model.
8. Additional investments are needed from partners.
9. Long-term contracts will affect interim service.
10. Delineation of capital program and interim service risks.

1. **Merced to Bakersfield interim service will generate significant socio-economic benefits.** The study noted that implementing the \$20.4 billion capital program is projected to generate \$37.9 billion in total economic activity and 203,000 job-years of employment. Other benefits noted related to safety, noise, improved travel times, reduced GHG emissions and congestion relief. These benefits will positively impact small and disadvantaged businesses and communities especially in the Central Valley.
2. **These investments will enhance mobility and create a multimodal hub at Merced.** KPMG concluded that interim service would have a major impact on existing mobility and rail travel between Silicon Valley and the Central Valley, based on the ETO's forecast of corridor-wide ridership increasing from 2.6 million passengers in 2017 to 8.8 million passengers in 2029. Riders will experience a travel time reduction of over 90 minutes between Merced and Bakersfield.
3. **Interim service allows the Authority's assets to be used, mitigating the risk that they will be unutilized.** Rather than sitting idle, the high-speed rail infrastructure investment can be used to run high-speed passenger service and begin generating benefits. Interim service may also allow an operator to refine and improve its passenger service, such as ticketing, marketing and operations, for follow-on high-speed rail segments.
4. **Interim service reduces the State's costs for passenger rail operations in the corridor.** The ETO's updated revenue and operating and maintenance cost forecasts estimate a reduction in the State's costs for passenger rail operations in this corridor by

approximately \$25.5 million to \$41.0 million in 2029 (in 2019\$) for Central Valley service.

5. **Merced to Bakersfield is affordable under a base case scenario.** Based on the current capital cost estimate—\$20.4 billion—and current projected funding of \$20.6 billion to \$23.4 billion in year-of-expenditure dollars (YOE\$), the study concludes that the project is affordable dependent on funding and cost estimates remaining stable.
6. **As part of a future Silicon Valley to Central Valley Line, adding Merced yields a positive return on investment.** KPMG evaluated the incremental capital cost for the Merced extension against the net revenues associated with it. The study concluded that adding Merced is estimated to generate \$2.5 billion to \$2.9 billion of additional discounted net cash flows through 2060. After taking into account the incremental capital cost, the estimated overall return on investment is \$0.5 billion to \$0.9 billion.
7. **Interim service requires a new business model.** An interim service business model would position the Authority as an infrastructure owner that would lease its high-speed rail infrastructure to an operator to cover operating and maintenance costs. These costs would be determined through the long-term Track and Systems and Trainsets contracts.
8. **Interim service plans require additional investments from state and regional partners.** The extension of ACE to Merced and construction of a cross-platform connection between high-speed rail services and both San Joaquins and the ACE services in Merced will require additional investments

over and above the approximately \$1 billion that the San Joaquin Joint Powers Authority (SJJPA) and San Joaquin Regional Rail Commission (SJJRC) have already secured from state, federal and local funds.

9. **Upcoming long-term contracts for Track and Systems and Trainsets will have implications for interim service.** Because these two contracts will each include long-term and complex provisions on performance levels, service plans and other terms, the interim service operator will need to conform to the terms of these two contracts.
10. **Delineation of capital program delivery risks and interim service risks.** Risks associated with delivering interim service fall into these two categories. The study noted that the capital program for delivering Merced to Bakersfield, bookend projects and system-wide planning are multiple mega-projects which exist regardless of whether interim service is implemented. Interim service risks are risks associated with implementing operations and can take the form of Authority risks, shared risks or risks owned by other parties.

BUSINESS CASE ASSESSMENT - RECOMMENDATIONS

The Business Case Assessment Study recommendations for advancing interim service are listed in the box and summarized in more detail below:

1. Implement interim service to unlock mobility benefits and fund infrastructure maintenance.
2. Pursue an interagency agreement with other agencies.
3. Secure funding streams to complete capital program.
4. Preparatory work required before executing Track and Systems and trainsets contracts.
5. Advance extensions to downtown Bakersfield and Merced incrementally by segment.

- 1. Implement interim service to unlock mobility benefits and to fund infrastructure maintenance.** Interim service unlocks the socio-economic benefits associated with high-speed rail passenger service, described above, prior to the completion of the Silicon Valley to Central Valley Line. Further, it reduces risks associated with unutilized assets sitting idle in the Central Valley prior to expanding the system to the Silicon Valley. Interim service could also provide a dedicated funding source to maintain the Authority's infrastructure assets in a state of good repair and meet long-term contractual obligations.
- 2. Pursue an interagency agreement with other agencies.** The study recommends that the Authority secure a sufficient level of commitment, through a Memorandum of Understanding, from regional partners and

the California State Transportation Agency (CalSTA) before making major long-term commitments and operating decisions for interim service.

- 3. Secure funding streams to complete capital program.** KPMG recommends that the Authority take steps to secure the remaining Proposition 1A construction funds at the appropriate time (estimated in FY21/22) to complete the capital program for Merced-Bakersfield interim service and reduce uncertainty related to affordability. Further, KPMG recommends that the Authority work with key stakeholders and partner agencies to gain stakeholder consensus to increase certainty of securing funding.
- 4. Preparatory work is required before executing Track and Systems and Trainsets contracts.** The KPMG study recommended that the Authority should ensure stakeholders are committed to interim service before additional major contracts are executed and that the Track and Systems contract include flexibility to comply with the minimum scope of the federal grant requirements. Civil works contracts should also be fully aligned with the Track and Systems contracts and all right of way should be acquired for the 119-mile high-speed test track.
- 5. Advance extensions to Bakersfield and Merced incrementally by segment.** These extensions could be undertaken if certain milestones are achieved or risks are mitigated including achieving the Record of Decision for the Central Valley Wye, determining affordability based on bids, securing access to funding and settling FY10 funding risks.



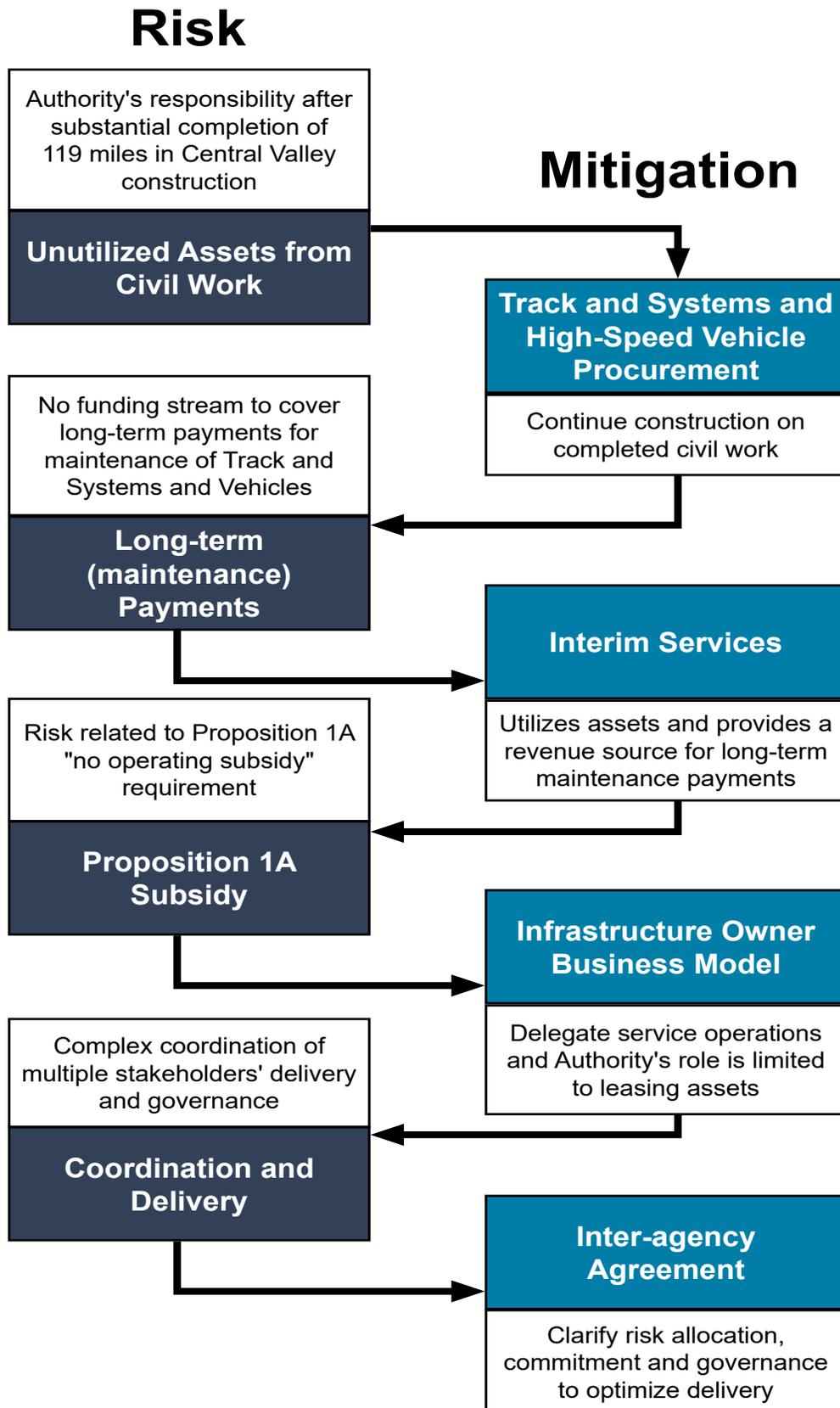
BUSINESS CASE ASSESSMENT - INTERIM SERVICE RISK MITIGATION STRATEGY

As noted in the conclusions summarized above, KPMG identified a range of both risks and benefits associated with interim service between Merced and Bakersfield. In addition, the study laid out a series of risks and related risk mitigations which are illustrated in **Exhibit 3.0**.

KPMG noted that, after the civil works in the Central Valley are completed, the Authority will be responsible for the maintenance and security of these newly-constructed assets. The Authority's plan to procure Track and Systems and Trainsets contracts is to mitigate the risk of unused civil works assets. Both contracts are to be structured so that the contractors maintain these assets for 30 years.

Interim service would provide a mechanism to pay for the long-term maintenance costs associated with these assets. Further, interim service could provide the state with the socio-economic benefits associated with high-speed passenger service. KPMG suggested that, for the duration of interim service, the Authority limit its role to only being an infrastructure provider by leasing its rail assets and delegating interim service operations. This recommendation is essentially that the Authority adopt an interim service business model, described in more detail below.

Exhibit 3.0: Interim Service Risk Mitigation



BUSINESS CASE ASSESSMENT - INTERIM SERVICE BUSINESS MODEL

In prior business plans, the Authority has laid out a business model which defines the roles and responsibilities of various entities for high-speed rail passenger operations. This business model has been fully described in those prior plans (See https://www.hsr.ca.gov/about/business_plans). As part of its Business Case Assessment Study, KPMG recommends that the Authority adopt a different business model for interim service. This business model, shown in **Exhibit 3.1**, would follow an infrastructure owner approach that allow use of the infrastructure until the Silicon Valley to Central Valley Line is complete. More specifically, the study recommends the Authority consider implementing an "infrastructure owner" model for interim service, in which it leases its

infrastructure to a third-party public entity, such as the SJJPA/SJJRC, to operate a high-speed rail service.

This interim service business model is similar to the current arrangement that the ACE and Amtrak San Joaquins services have with Union Pacific Railroad (UPRR) and BNSF Railway (BNSF) that allow for passenger service on their infrastructure. Under this model, the Authority would lease its rail assets so that an operator could provide passenger service on the Authority's assets. The exhibit shows that passengers pay fares to ride high-speed trains between Merced and Bakersfield and those revenues come to the Authority in the form of lease payments. In return, the Authority provides access to its infrastructure to the service operator. This is described more fully in KPMG's Business Case Assessment Study.

Exhibit 3.1: Merced-Bakersfield Interim Service Business Model

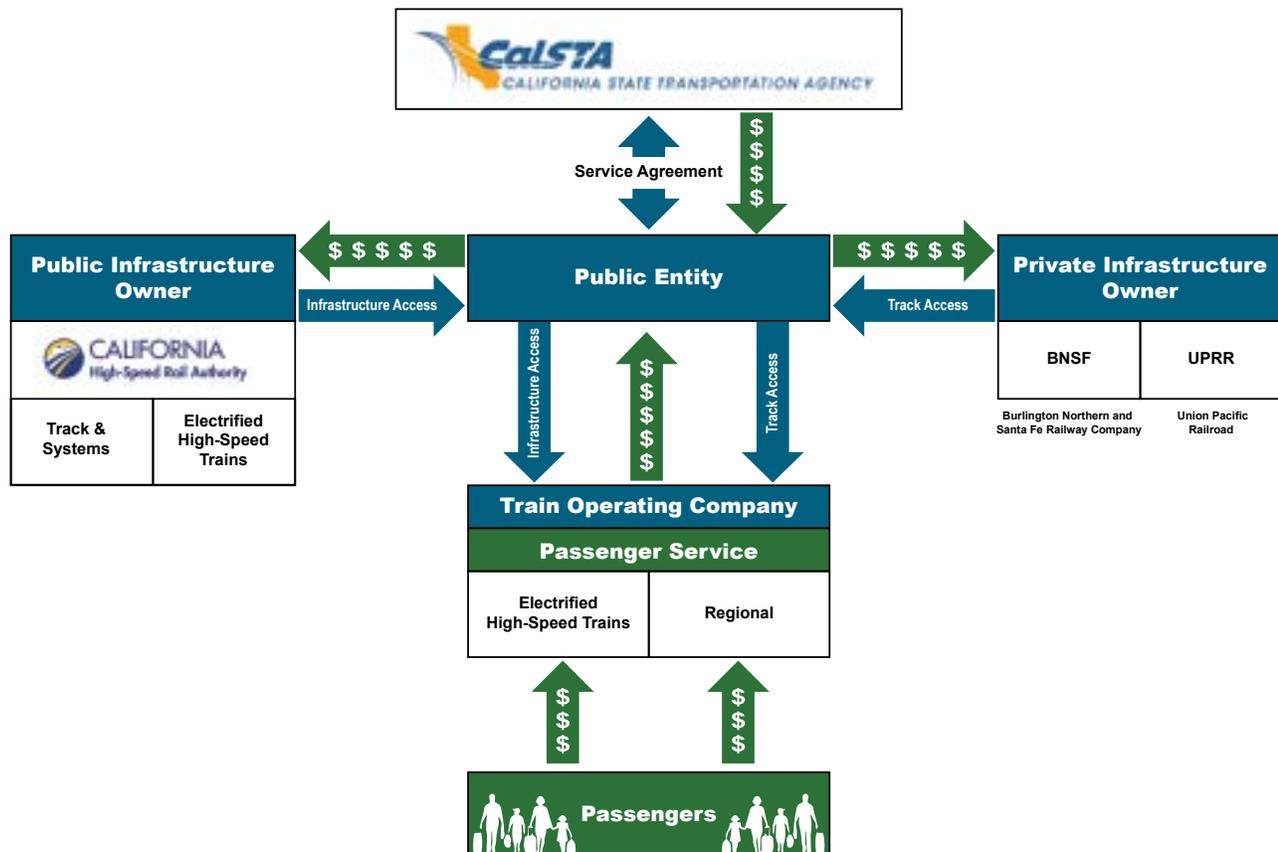
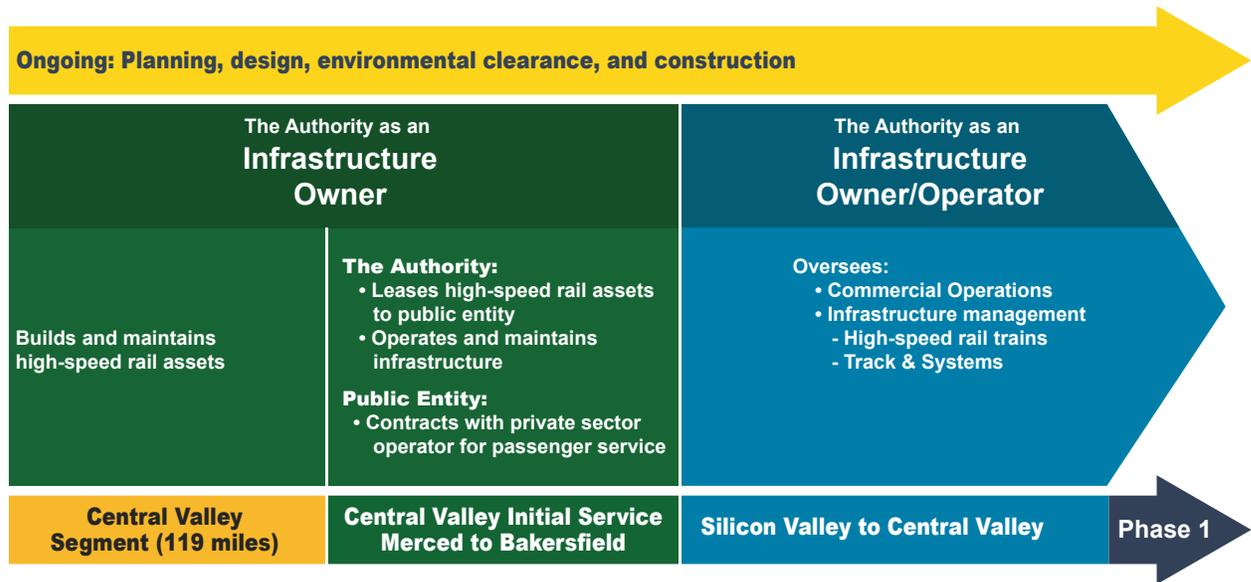


Exhibit 3.2: Evolution of California High-Speed Rail Responsibilities Through Time

As noted by KPMG, the Authority's role will evolve over time and once the system has been extended to the Silicon Valley to Central Valley Line, the Authority's role will evolve from the interim service business model to the long-term infrastructure owner/operator business model as laid out in previous business plans. This evolution is illustrated in **Exhibit 3.2**.

To view the KPMG Study, visit https://hsr.ca.gov/docs/about/business_plans/2020_Business_Plan_Business_Case_Assessment_Study.pdf

EARLY TRAIN OPERATOR SIDE-BY-SIDE STUDY

The ETO's Side-by-Side Study (Quantitative Report) compared the recommended high-speed rail investment between Bakersfield and Merced to other potential early investment options in the San Francisco to Gilroy corridor and the Burbank to Anaheim corridor. The ETO concluded that the high-speed rail investment in the Central Valley corridor provides the highest benefits, requires the least additional system investment and reduces, rather than increases, the operating subsidy of the system, including regional rail operators. The Northern California and Southern California corridors require considerable additional regional investments, whereas, the Merced to Bakersfield corridor requires only up to \$500 million in additional regional funding to achieve significantly greater benefits.

The Side-by-Side Study compared the results of a similar level of high-speed rail investment in each corridor evaluating key factors including ridership, revenue, passenger miles and resulting reductions in vehicles, vehicle miles traveled and air quality emissions.

The ETO assessed the existing conditions in each corridor evaluated, then evaluated regional improvement plans and both the funding available and the funding that would be required to improve regional services utilizing the high-speed rail investment. The funded regional investment (Scenario 2 from the ETO Side-by-Side Study) was used as a Baseline to compare the results of adding high-speed rail infrastructure (Scenario

3) and service in each corridor (Scenario 4). The Side-by-Side Study compared the results of a similar level of high-speed rail investment in each corridor, evaluating key factors such as ridership, revenue, passenger miles and resulting reductions in vehicles, vehicle miles traveled and air quality emissions. **Table 3.0** shows the evaluation criteria used and the results of the analysis.

ETO Updated Ridership Forecast for Merced to Bakersfield:

In keeping with its responsibilities overseeing the Authority's ridership forecasts, the ETO prepared an updated Central Valley corridor forecast for this Draft 2020 Business Plan. Its updated forecast projects 8.8 million annual systemwide riders in the corridor in 2029, compared to a 2029 No Build (no high-speed rail investment in the corridor) of 4 million annual riders—a doubling of systemwide rail ridership. For more information on this updated analysis, see the Central Valley Segment System Management & Operations Interim Financial Plan at:

https://hsr.ca.gov/docs/about/business_plans/2020_Business_Plan_CV_Segment_System_Mgmt_Operations_Interim_Fin_plan.pdf

Table 3.0: Early Train Operator Side-by-Side Comparison, Summary of Quantitative Findings*

Evaluation Criteria	Northern California Peninsula Corridor	Central Valley Corridor	Southern California Burbank to Anaheim Corridor
Corridor Statistics			
Length of Corridor (in miles)	77	171	44
Highest Speed Attainable (in mph)	110	220	125
Service Results			
Ridership Increase (in millions)	1.9	4.8	2.5
Revenue Increase (in \$ millions)	25.9	117.2	30.0
Additional Annual Passenger Miles Traveled (in millions)	91	340	108
Congestion Relief			
Annual Vehicle Miles Traveled Reduction (in millions of miles)	75.7	283.6	90.0
Annual Vehicle Reduction (in thousands)**	4.5	21.0	6.7
Air Quality Benefits			
Greenhouse Gas Emissions Reduction (in thousands metric tons of CO ₂)	36.8	50.6	19.3
Schedule Horizon			
High-Speed Rail Operation Within 10 Years	Possible	Yes	Unlikely

*Comparison between Funded Regional Investments (Scenario 2) and HSR Investment (Scenario 4)

**Assumes average mileage per car of 13,476 miles per year

"With major new infrastructure clearly visible in nearly all parts of the Central Valley, a transformative mobility option is within our reach. The completion of the first high-speed rail operating segment between Bakersfield and Merced provides connections to established rail connections in ACE and the San Joaquin Services, as well as a far-reaching statewide bus network. By virtue of its central location, the high-speed trains will dramatically improve travel options between southern and northern California and between the Central Valley and the urban centers of Sacramento, San Jose and Oakland/San Francisco."

— Stacy Mortensen

Executive Director, San Joaquin Regional Rail Commission

ETO Central Valley Corridor Summary Findings:

- **Attains the highest speed:** up to 220 miles per hour;
- **Generates the largest ridership increase:** 4.8 million additional systemwide annual riders;
- **Yields the highest revenue increase:** \$117.2 million in additional system revenues from passenger fares;
- **Provides the most congestion relief:** a reduction of 284 million annual vehicle miles traveled (VMT); and
- **Results in the highest air quality benefits:** 50,000 metric ton reduction in GHG emissions.

These benefits primarily result from the ability to implement electrified high-speed rail service along a longer corridor, doubling the frequency of service in the entire system and leading to the greatest amount of travel time savings for passengers.

Table 3.1 shows the funding necessary to achieve these results. It is important to note, that a standalone high-speed rail investment in any one corridor requires regional investments to effectively connect it with other passenger rail and public transit systems. In Southern California, additional capacity will be necessary in these feeder lines to drive the benefits of a regional high-speed rail investment for the system.

Table 3.1: Early Train Operator Side-by-Side Comparison, Capital Costs (in \$YOE billions)

Capital Cost Requirements	Northern California Peninsula Corridor	Central Valley Corridor	Southern California Burbank to Anaheim Corridor
Regional Funding Committed	2.3	1.0	1.8
Funding Required			
Additional Regional Funding Required	17.1	0.5	7.0
Additional High-Speed Rail Funding Required	5.3	4.8	7.0
Total Additional Funding Required	22.4	5.3	14.0

As the ETO Study shows, in the Central Valley, the construction of a longer high-speed rail line with significant travel time reductions (90 to 100 minutes) and increased service frequency attracts new ridership. The travel time savings delivered by a faster service attracts new riders, from a larger catchment area connected to the state rail system.

It is not possible to achieve this kind of benefit due to the mixed service operation in the Northern or Southern California corridors where high-speed rail investments focus on capacity improvements and which are already served by extensive regional services. The most significant benefits of high-

speed rail are realized when two of these corridors are connected serving intercity markets. The results from the ETO Side-by-Side Study should not be construed as an indication that high-speed rail would not ultimately benefit these areas.

The ETO concluded that significant additional regional investments in the Burbank to Anaheim and San Francisco to Gilroy corridors, the majority of which are not currently funded, would be necessary to yield comparable benefits to the Merced to Bakersfield corridor. Finally, the ETO also noted that only the Central Valley option with high-speed rail operation showed an improvement in

the fare revenue to operating cost ratio compared to current operations.

ETO Merced to Bakersfield Conclusions:

- Faster, more frequent and more reliable passenger service than is currently available—reducing the travel time between Bakersfield and Merced by 90 to 100 minutes;
- Partnerships with other operators enhance connectivity to other passenger rail services in Merced, where there is a commitment of nearly \$1 billion to bring the ACE and San Joaquins services to connect with high-speed rail;
- Faster service and greater connectivity provide the highest ridership potential and fare revenue of any other investment option, resulting in a lower State operating subsidy;
- Central Valley air quality is improved by significant reductions in VMT due to higher ridership systemwide, which results in the highest reduction in total system roadway vehicle emissions, and by shifting from diesel to electrified high-speed trains between Merced and Bakersfield; and
- It allows assets constructed for high-speed rail to be used for early testing and electrified, high-speed operations.

To view the ETO's Study, visit https://hsr.ca.gov/docs/about/business_plans/2020_Business_Plan_Side_by_Side_Study_Quantitative_Report.pdf

THESE STUDIES AFFIRM OUR MERCED TO BAKERSFIELD RECOMMENDATION

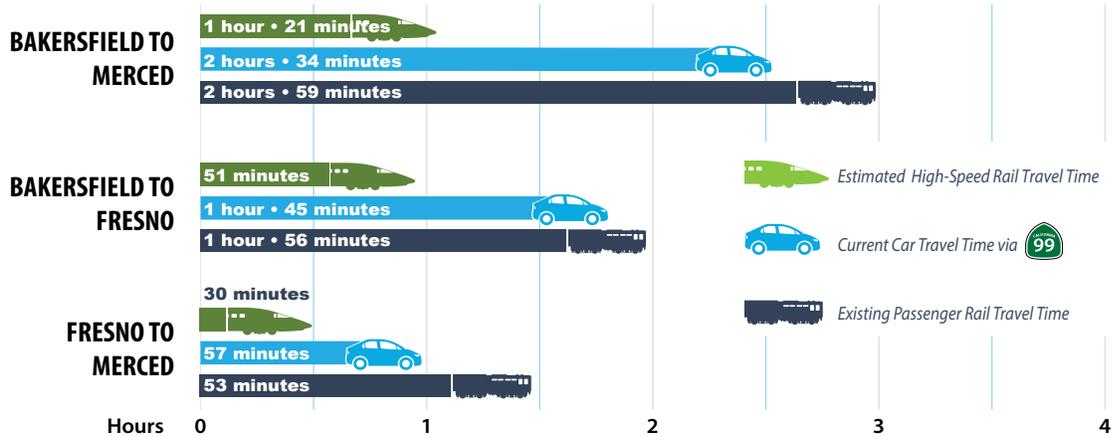
These two studies reaffirm our recommendation to invest now in electrified high-speed rail service in the Merced-Bakersfield corridor. This is a realistic and pragmatic approach to continuing to expand outward from current construction in the Central Valley with funding available between now and 2030. It allows us to build on the federal investments and commitments made to the Central Valley community. Importantly, this approach is consistent with our guiding principle to initiate high-speed rail service as soon as possible and with the objectives for early service contemplated in our federal grant agreements.

BETTER CONNECTIVITY LEADS TO ECONOMIC VITALITY

Although the Central Valley's population is growing, its economy has not grown at the same rate as the Bay Area and Los Angeles Basin economic mega regions. To address that, Central Valley communities and leaders have worked for years to diversify and grow the regional economy through a range of strategies. This has included creating faster and better connections to the Bay Area and the Los Angeles Basin. Today, there are no quick or easy connections between Fresno and the Silicon Valley. There are no direct flights which leaves travelers with a choice between a long drive or a multiple transfer ride on existing passenger rail that can take four to five hours.

The 171-mile trip from Merced to Bakersfield currently takes 2.5 hours by car and more than 3 hours by intercity passenger rail. Introducing high-speed rail service in that corridor will cut that travel time in half, as shown in **Exhibit 3.3** on page 64.

Exhibit 3.3: Comparative Travel Times, Future High-Speed Rail, Existing Auto and Passenger Rail



*All travel times are approximate. Trips are measured from central business district, existing passenger rail stations, or planned high-speed rail stations. Approximate car travel times were estimated based on the California Statewide Travel Demand Model. Existing passenger rail travel times were approximated using the Amtrak website, referencing schedules current as of publication. High-speed rail travel times were estimated by the Authority using internal modeling, which includes at least 5% padded time. Run times do not take into account integration with other operators' services in blended sections.

This first high-speed rail building block will:

- Reduce travel time along the corridor by 90 to 100 minutes;
- Improve operational reliability on this dedicated, passenger-only rail line, which will allow faster, more frequent, on-time service;
- Improve access and connectivity to other California destinations through better connections with ACE and San Joaquins services in the north and Thruway Bus Service at Bakersfield for travel to Southern California;
- Create the backbone of the high-speed rail system; and
- Demonstrate the value of high-speed rail service.

Delivering more frequent and faster service on an electrified high-speed rail line with improved connections and more convenient transfers to expanded regional services will improve travel not just for Central Valley residents but for all Californians. The Merced to Bakersfield line will

begin building the market for high-speed rail in California.

SERVING A GROWING ECONOMIC REGION

The Central Valley is becoming more prominent as the state's third regional economic engine. As a whole, the Central Valley is home to approximately 6 million residents. The southern portion of this region is home to 3 million residents and includes Fresno and Bakersfield, two of the 10 most populated cities in California, experiencing a 20-percent population growth since 2000. The 171-mile line connects the three largest cities in the Central Valley, which are growing at rates higher than the state average. Merced, Fresno and Kern counties will see an average of 10-percent growth from 2019 to 2028, when the Merced to Bakersfield line is scheduled to open. The line will serve areas seeing double the state's overall projected population growth of 5 percent, according to population projections from the California Department of Finance.

High-speed rail is a critical element of a broader strategy to foster greater business-to-business

interaction, to further enhance the region's attractiveness to businesses and employers and to expand economic opportunity to more Californians. It will create new linkages between the region's educational institutions and medical centers, which also serve as a catalyst for regional development. High-speed rail stations will support community economic revitalization efforts and a clean, net-zero emissions rail line can help bring more travelers to the region for outdoor recreation, further bolstering the tourism industry.

Extensions to Merced and Bakersfield allow high-speed rail service to reach these destinations and population centers more directly. This would eliminate transferring passengers to other services at Poplar Avenue and Madera just short of major Central Valley destinations.

These investments are expected to deliver significant economic benefits. Implementation of the \$20.4 billion capital program is forecast to bring immediate economic benefit to the state, and especially to disadvantaged communities in the Central Valley. The Authority estimates that these investments will generate approximately 203,000 job-years of employment and nearly \$40 billion in total economic activity.

Currently, the Bay Area Council's Economic Institute is preparing a report entitled, *The Future is Fresno: Exploring the Valley to Valley Connection*. The report highlights the commercial and social relationships between Silicon Valley and the Central Valley. Although the report is not yet publicly available, the Economic Institute previewed the report through a series of two-page summaries posted on its website. By highlighting the opportunities for economic growth in the Central Valley, the Economic Institute makes a case for the Silicon Valley to Central Valley high-speed

rail connection between the two regions and urges Bay Area leaders to consider the following:

- **Job Growth Rates:** During 2019, the report notes job growth rates in Fresno County are higher than both the San Francisco and San José metropolitan areas. According to federal data, nearly 44 percent of Fresno's job growth since 2015 has centered around health care and education.
- **Housing:** The report notes that the median home price in Fresno County is \$243,700, in comparison to more than \$1 million in Santa Clara County. With an increase of more than 37 percent in residential building permits from 2017 to 2018, the Central Valley can provide affordable home ownership for Californians.
- **Livable and Workable Communities:** In addition to affordable housing, the Central Valley region holds some of the highest number of Opportunity Zones in the state. The report notes that Fresno County has 24 zones, the second highest total in the state. Opportunity Zones are a federally sponsored program that attract investment through tax incentives.

"...Getting a real project done and being able to test this technology, first of its kind in the nation, and begin the economic development opportunities which this presents."

— Governor Gavin Newsom

MERCED TO BAKERSFIELD CAPITAL COST

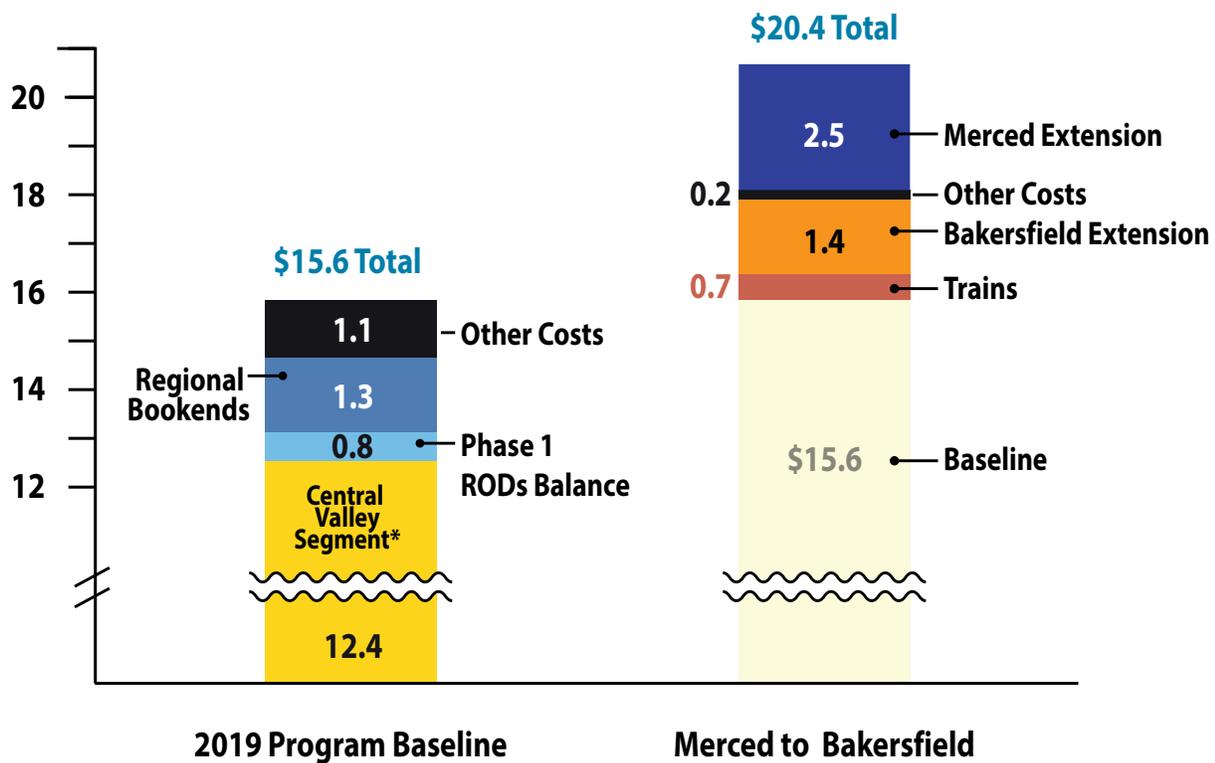
For the 2019 Project Update Report, we conducted a comprehensive Estimate-at-Completion (EAC) review of the 119-mile Central Valley Segment. In addition, we conducted a Monte Carlo analysis on the current and remaining scope of that segment, as well as the Merced to Bakersfield line. For more information on this cost review and update process, please see the 2019 Project Update Report at https://www.hsr.ca.gov/docs/about/legislative_affairs/SB1029_Project_Update_Report_050119.pdf

Subsequently, the Board of Directors incorporated the \$12.4 billion updated cost estimate for the Central Valley Segment into its \$15.6 billion the 2019 Program Baseline Budget, which was adopted in May 2019. The Baseline Budget is shown on the left side of **Exhibit 3.4**. It shows

the \$12.4 billion committed to constructing the 119-mile Central Valley Segment, the program costs associated with that work, plus the cost of completing the remaining Phase 1 RODs to fulfill the federal grant agreements. It also shows the \$1.3 billion committed to funding regional bookend investments, such as the Link Union Station (Link US) project in Southern California and the Caltrain Peninsula Corridor Electrification Project in Northern California.

The exhibit below also shows the \$4.8 billion incremental cost estimate for completing extensions to Bakersfield and Merced. These estimates include the procurement of trains, completion of Track and Systems, stations and operation and maintenance facilities—all the infrastructure to initiate passenger service on this line.

Exhibit 3.4: Merced to Bakersfield Building Blocks (\$YOE in Billions)



*119 miles of civil construction and tracks, Madera to Poplar Avenue.

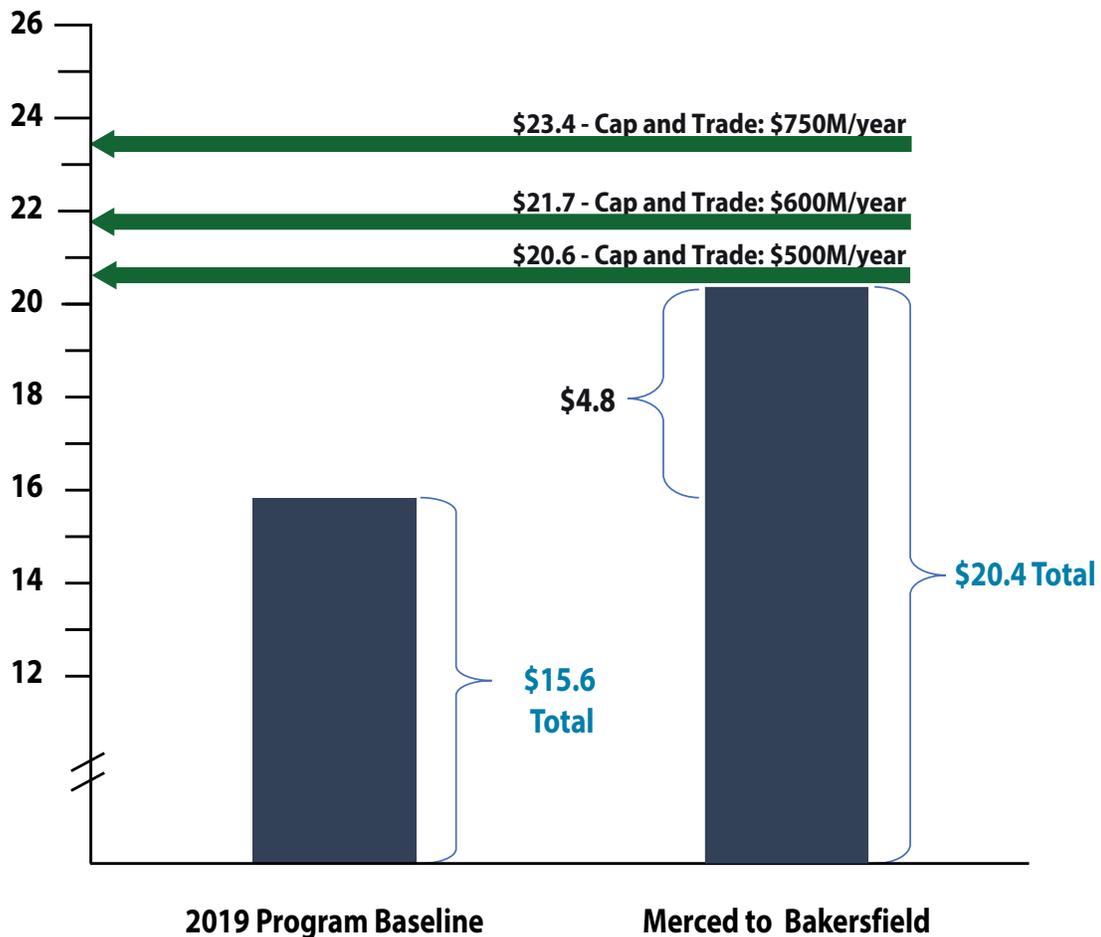
FUNDING FOR MERCED TO BAKERSFIELD

Exhibit 3.5 shows that based on current cost estimates and funding projections, there is sufficient funding to deliver the Merced to Bakersfield line. The exhibit below builds on **Exhibit 3.4** (page 66), comparing our cost estimates to our projected funding through 2030, with future Cap-and-Trade funds shown in a range. Because of the variability of Cap-and-Trade auctions, we have established a range of future Cap-and-Trade receipts for purposes of capital planning. The low range assumes that the Authority will receive \$500 million per year and the high range assumes \$750 million per year.

Currently, proceeds have averaged \$730 million per year since Assembly Bill 398 extended this program to 2030.

If future Cap-and-Trade auctions remain stable, we can deliver Merced to Bakersfield on a pay-as-you-go basis. If future Cap-and-Trade revenues were to come in below today's stable levels, we would need to work with the administration on funding options to deliver the segment by 2028. If Cap-and-Trade revenues continue to come in at higher levels, and if the capital costs of the project remain stable, the Authority's funding could exceed its costs.

Exhibit 3.5: Merced to Bakersfield Cost and Funding Comparison (\$YOE in Billions)



ESTABLISHING A FUND FOR PROGRAM RESERVES AND STRATEGIC INITIATIVES

Over the past several years, the Authority has worked hard to strengthen the program's governance and to evaluate both the available funding and the scope of what can be delivered with that funding. This effort has been focused on establishing a baseline based on known secured funding that delivery efforts can be managed against. As described elsewhere in this Draft 2020 Business Plan, the baseline has been purposefully conservative in assuming the low end of revenues for the Cap-and-Trade Program (\$500 million per year) and a capital cost estimate with significant contingency to cover potential remaining risk areas.

However, the auction proceeds from the Cap-and-Trade Program have consistently outperformed the conservative \$500 million/year assumption since the program was extended out to 2030. In the first two fiscal years since the program's extension, auction proceeds have provided a total of \$1.49 billion, for a pace closer to \$750 million per year. If the program continues to perform at this higher level, additional funding will be available to the Authority. Following the strong governance models already employed, the Authority could establish a fund that can be used for two important purposes, both of which would be developed and managed at the direction of the Board of Directors:

- Program reserve:** Developing a program reserve to handle additional risk that may be incurred with construction in the Central Valley. The program reserve will be the backstop in case contract bids come in higher than anticipated or new risks are identified that exceed current contingency levels.
- Strategic initiatives:** Advancing scope for program delivery activities in Northern and Southern California. The current baseline has funded project development efforts on the statewide program through completion of the Record of Decision (ROD) for all project sections on the Phase 1 system. That work will be completed in the next 18 to 24 months. However, there is significant additional program delivery work that needs to occur before the Authority would be ready to issue construction contracts for those project sections. These long lead-time items will be scoped and added to the program's baseline of work if Cap-and-Trade funds continue to exceed the projected amount.

As we have described elsewhere in this 2020 Draft Business Plan, we are going to use the lessons learned from construction in the Central Valley to be more deliberate in our approach in preparing for construction in Northern and Southern California. This means completing more of the agency scope before issuing construction contracts. These efforts can include:

- Geotechnical investigations:** In the Pacheco Pass in Northern California and in the Tehachapi and San Gabriel Mountains in Southern California, we will need to complete several years of geotechnical investigations to develop a geotechnical baseline report that will provide potential bidders with a better understanding of what they will be facing in trying to build tunnels and other major structures in those mountainous regions. These are long lead-time items that remain on the critical path to being able to complete the Silicon Valley to Central Valley and Phase 1 portions of the system and would be a priority to advance

as the RODs are achieved in those project sections.

- **Right of Way:** Acquiring the right of way that will be needed to construct the system is of critical importance. As has been demonstrated in the Central Valley, right-of-way acquisition can be challenging and time-consuming. By starting early on those parcels that will have the biggest impact to construction or where delaying acquisition may significantly increase its cost (e.g., if there is development proposed on the site), we will work to ensure that our right-of-way plans in Northern and Southern California are advanced further than they were in the Central Valley at the time when construction contracts were issued.
- **Pre-construction activities:** Advancing design, entering into third-party agreements, and preparing for utility relocations can help minimize the changes that might occur once construction occurs. By ensuring that the contractor has a clear path once the contractor is on board, we will be able to reduce the risks that their progress can be deterred by outside parties whose cooperation would be required but can't be assured.

Although additional funds will be necessary to enter into construction contracts in Northern and Southern California, these critical works are the necessary steps that can be advanced if the current funding sources remain strong and the baseline budgets can be expanded to accommodate them. However, the other key opportunity that this funding offers is the ability to leverage it to pursue additional funds and partnerships to deliver more of the program.

As we have seen on the program already, the state's investment in high-speed rail can be part of the matching funds to pursue additional federal investment in the program, which would now turn toward getting to the Bay Area and to Southern California. At the same time, there are also opportunities to leverage investments in shared corridors that would have benefits that stretch beyond just high-speed rail. Similar to the electrification of Caltrain between San Francisco and San José, the system's build-out between San Francisco and Gilroy and between Burbank and Anaheim will also contribute toward substantially enhanced commuter rail service in those regions. By joining with local and regional partners, construction of these shared corridors can move ahead as additional building blocks with clear near-term benefits while we continue to pursue the full funding necessary for the major construction needed to cross the mountain ranges between the Central Valley and the Bay Area and Los Angeles Basin.

This is a pragmatic approach to managing the advancement of the program across the state, while remaining prudent with the funds that have been made available to us. By establishing this fund from excess Cap-and-Trade revenues, we will be able to both give ourselves and the public greater comfort that the work in the Central Valley will be completed as planned, while laying the groundwork and developing the next generation of partnerships that will be critical to advancing the system beyond the Central Valley to connect the regions of the state as the voters asked us to do when they approved the system.

EXTENDING CONSTRUCTION AND BUILDING ON LESSONS LEARNED

With updated controls in place and the completion of the environmental ROD to Bakersfield (the Locally Generated Alternative, or LGA), we are ready to begin the pre-construction work for the extension south from Poplar Avenue to Bakersfield. Learning from our past challenges, we will begin by doing "first order" work that will lay the foundation for construction. This will include the engineering work related to utility relocations, third party requirements and required permit conditions. Once these have been defined, we would begin the land-right conveyances for utilities and right-of-way acquisition.

An example of this is the relocation of the Golden Empire Transit (GET) Facility in Bakersfield to accommodate construction of the Bakersfield F Street station. This long-lead right-of-way purchase and relocation will require a large parcel to accommodate the construction of a new transit maintenance and storage yard. Relocation of this facility early will allow the transit agency to implement planned upgrades and address future regional bus service needs and ensure that the area is available for high-speed rail construction.

As this work is underway it will help inform our procurement planning for the next civil construction contracts. We will incorporate experience from the first three design-build contracts and consider alternative strategies as part of our recommendations to the Board of Directors as they consider these future procurements. Only then will we advance future construction procurements.

As also noted in the KPMG Business Case Assessment Study, this approach will significantly reduce many of the risks and challenges experienced in moving to construction early on

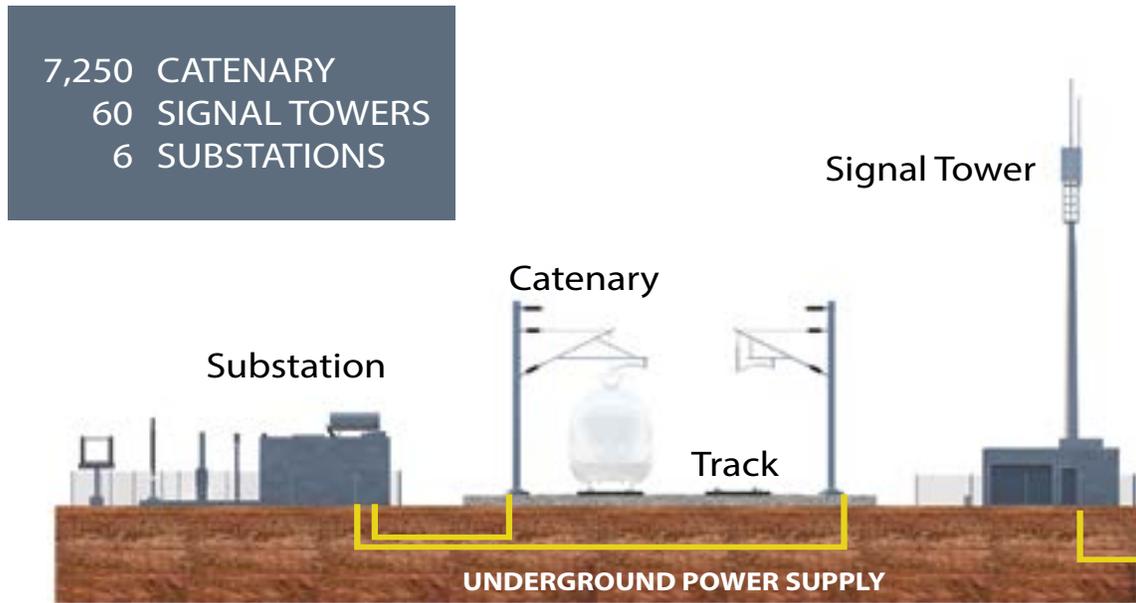
the initial 119-mile section between Madera and Poplar Avenue. This approach will also be used once the Central Valley Wye environmental review is complete on the extension to Merced in fall 2020.

PLANNING FOR FUTURE OPERATIONS

In addition to advancing construction, we need to turn our attention toward operation. Once our Track and Systems contractor is on board, we need to advance the final major element—trainsets. Manufacturing trainsets takes 7-8 years, and these will be a new type of trainset. Prototype trains will be required for testing track, systems and electrification elements.

High-speed rail development requires an integrated approach to design of all components together—track bed, track, electrification, communications and trainsets. A safe and reliable system needs to be designed and constructed together. We will need to advance that final component of the system if we are to be ready to begin testing trains by 2025. The next phase of infrastructure development is to design and integrate the operations elements for electrified high-speed rail service. For high-speed rail this will involve careful planning, design and construction of the track, systems, trains, and overhead electrical power.

Exhibit 3.6, shows the various components involved in the operation of an electrified train system. We have begun the procurement of the Track and Systems. However, we will need to begin additional long-lead procurements that require specialized equipment and testing such as trains and the electrical connections that will power the system.

Exhibit 3.6: Key Train and Infrastructure Integration**HIGH-SPEED RAIL TRAINS**

Development of electrified high-speed rail requires careful attention to connections between the vehicle and other power, communications and track elements. The wheel and track designs need to work together, and the trainset pantograph specifications are necessary to integrate with overhead catenary requirements. Each trainset must also include the necessary equipment to communicate with the signal system.

The development of trainsets typically takes seven to eight years, involving construction of prototypes for testing and safety certification on the completed Track and Systems and power supply infrastructure. No "off-the-shelf train" technology exists in the United States for the 220-mph system being designed in California. Last year, the Federal Railroad Administration (FRA) released Tier 3 (high-speed rail) safety rule requirements for trainsets—the first in the United States. This will require all

high-speed train manufacturers to adjust existing designs to meet these requirements.

This design effort will take extensive coordination between multiple contractors (likely from multiple countries), and state and federal agency staff. The rolling stock will require certification by the FRA for operation. As such, this procurement is another long-lead activity that will begin this year.

As with the Track and Systems procurement, we will utilize a performance-based procurement strategy to bring together the best service-proven international high-speed rail experience for application in the United States. We intend the procurement strategy will incorporate flexibility and controls to allow delivery in a phased manner to ensure seamless integration as the system expands. This procurement will also include 30 years of maintenance for trainsets and maintenance facilities.

MEMORANDUMS OF UNDERSTANDING WITH STATE AND REGIONAL PARTNERS

As also noted in KPMG's Business Case Assessment Study, several agreements are necessary for high-speed rail operations. The development of these agreements for initial service and for operations in blended segments will cover a range of comprehensive and very specific issues, including:

- Coordinated implementation timelines and milestones;
- Funding agreements;
- Station development;
- Service plans; and
- Infrastructure lease agreements.

We will need to develop agreements with the Los Angeles Metropolitan Transit Authority (Metro) and Caltrain to address our joint operations in these high-speed rail blended sections. We will also be exploring future joint benefits from the development of joint infrastructure that may be used by other high-speed rail operators, such as Virgin Trains USA. Development of these agreements require extensive consultation and will serve as the cornerstone for the successful introduction of high-speed rail service and integration with other passenger rail services.

OPERATIONS AND MAINTENANCE FACILITIES

High-speed rail operations will require five different facility types: Maintenance of Way (MOW) facilities, an Operations Control Center (OCC), ultimately a Heavy Maintenance Facility (HMF) for trains, an operations management headquarters location and Light Maintenance Facilities (LMF). In the November 2019 Board meeting, staff presented information to the Board of Directors on the

number, types and benefits from the construction of maintenance facilities throughout the system.

The design and siting of operations and maintenance facilities are necessary for interim operations in the Central Valley. Siting of the first facilities will begin in 2020 with the procurement of the Track and Systems and Trainset contracts which require these facilities for planning, design and construction purposes. These decisions will need to balance the service phasing needs with the ultimate system requirements of the Phase 1 system.

Two facility types have been included in the Track and Systems procurement:

- The OCC controls all train operation dispatch and movements. This is will be a 24/7 operation and will have an initial staffing of 40 employees.
- The MOW Facility serves as the management office for system infrastructure inspection, maintenance and repairs. Each region will ultimately have a MOW facility. The one in the Central Valley will also include space for a central warehouse and training area. These buildings, located adjacent to the high-speed rail line, will house over 100 staff dispatched to the field daily.

The first LMF to support Central Valley service will be included in the rolling stock procurement. Ultimately LMF facilities will be necessary at each terminal station. In the Central Valley, the LMF and HMF will be combined. This site will receive and prepare the trains for service through a testing, commissioning and acceptance process. Once passenger service begins, train inspections and repairs will occur at this facility. Staffing will begin around 60-80 and grow as the system grows to nearly 300 employees including machinists,

welders, electronic technicians, and other operations and management staff. As the system expands and MOW and LMF sites added, staffing will grow and be located strategically along the line for effective and efficient maintenance, operations and oversight.

The operations of the system will generate ongoing economic benefits to communities and businesses. A total economic output of \$1.6 billion is anticipated and includes the direct, indirect and induced effects that flow from these investments and staffing. The relative benefit of each facility type is summarized in **Table 3.2**.

Table 3.2: Economic Impact of Facilities, Based on 10-Year Staffing (\$ in Millions)

Facility Type	Direct Effects	Indirect Effects	Induced Effects	Total
Maintenance of Way Facilities	284	129	97	510
Operations Control Center	118	54	39	211
Heavy Maintenance Facility	192	88	60	339
Operations Headquarters	201	92	87	379
Light Maintenance Facilities	103	47	32	182
Total	898	409	315	1,622

BUILDING SUSTAINABLE POWER

To meet our commitment to operating on 100-percent renewable energy, staff are identifying the steps for power generation and renewable power purchases. Over the next two years, we will finalize and initiate procurement for the power needs of the system, aligned and scaled with the delivery of Track and Systems and operating segments.

The current strategy is to use land that we already own for solar generation and battery storage resources. The capital construction, operations and maintenance of these resources will be undertaken by a private entity engaged through a power-purchase agreement. We already have an integrated team of renewable energy experts, along with right-of-way, environmental, contracting and legal staff, finalizing the strategy and approach. Staff has already begun to assess the right of way available from current construction to identify any unused parcels for future power generation use.

Staff will continue refining energy specifications and requirements that will inform future procurement documents for solar and storage solutions. This work will require close coordination with the track-and-system contractor for power-connection points, as well as the train manufacturer for train energy requirements. Ultimately, this will lead to the construction and testing of energy generation and battery storage for power delivery systems and train needs.

This approach to power supply speaks to the importance of system resilience. The system, and its power supply, must operate under any number of future conditions. This solar and storage approach:

- Reduces overall power demands, decreasing operating costs;
- Provides a source of back-up power should the grid unexpectedly shut off, enabling us to continue service for an extended period;

- Enables us to cost-effectively meet renewable energy commitments through the low-carbon fuel standard program; and
- Enables us to test the battery storage system prior to commercial operation and to identify additional potential capital cost savings.

STATION DEVELOPMENT

High-speed rail reconnects our cities and offers a once in a generation opportunity for city building. By connecting city centers high-speed rail stations will serve as a magnet that will bring these destinations closer together.

Well-planned high-speed rail station areas, and access to and from them, can unlock the potential of the rail system to meet transformative statewide economic and growth goals. The planning and design process is part of transforming these places to transit-oriented, multimodal hubs. Stations tailored to the unique characteristics of each city and the role the stations play in the system will evolve over time.

Today, as a first step, we have identified the elements necessary for access to the system. This includes the platforms for direct train access, as well as canopies to shelter customers and critical circulation elements to allow passengers to circulate between tracks and platforms. These initial passenger requirements are critical for safe and efficient operations and are part of the current Track and Systems procurement.

Station facilities, such as waiting rooms and other customer amenities, pedestrian, bicycle, transit and automobile approaches, site circulation, and public-realm amenities will be improved over time as ridership increases. This is the heart of the 'building block' approach. Delivering on- and off-boarding infrastructure for a functional system with the ability to expand as the system expands will require working with cities as they expand and integrate this new form of transportation into the surrounding community.



Photo: Western Coyote

Station site planning and station area discussions with cities has been underway for years. Site planning processes and city partnerships are a critical avenue for high-speed rail staff and city staff to create a vision of transformation for the next several decades. In 2020, we intend to focus our efforts on engaging with station cities to identify phasing options that fit within and enhance the local context and incentivize valuable development. We will also continue to work closely with environmental and public interest groups, developers, investors and others to pursue the development of public spaces and amenities near rail stations. In addition, planning staff are exploring how excess right of way is used to promote sustainable/resilient infrastructure to support high-speed rail operations as well as provide other benefits to the surrounding community.

Compact, mixed-use, dense development organized by and responding to visionary new plans for the cities with high-speed rail, along with coordinated local and regional land-use and conservation planning is vital to maintaining the state's quality of life and sustainability goals. Attracting a range of new development adjacent to zero-carbon transportation investments is a corner stone to addressing the pollution generated by transportation. No other state investment provides this opportunity to realize broad-based sustainable economic development, environmental benefits and social resilience.

"The Santa Clara Valley Open Space Authority is grateful to the California High-Speed Rail Authority for working closely with us and our conservation partners to coordinate high-speed rail designs, so they can accommodate wildlife movement as outlined in the Coyote Valley Landscape Linkage Report. We think this approach to collaborative and integrated planning with local entities should serve as a model statewide for other major infrastructure projects."

*— Andrea Mackenzie, General Manager
Santa Clara Valley Open Space Authority*



Rendering: Artist concept of high-speed rail platform

NORTHERN CALIFORNIA

Electrified rail is coming to Northern California. More than \$1.6 billion of Proposition 1A and other California High-Speed Rail Authority funding is at work supporting shared corridor investments in the Bay Area today.



MOVING FORWARD IN NORTHERN CALIFORNIA

The \$1.6 billion investment includes nearly \$300 million in environmental reviews from San Francisco to Merced, \$714 million for construction for the Caltrain Peninsula Corridor Electrification Project, \$84 million San Mateo Grade Separation and \$543 million for multiple connectivity projects supporting regional providers. These investments help to close funding gaps and result in improvements today that support future high-speed rail. These funding commitments are part of more than \$4.2 billion in state awards to public transit and rail projects in Northern California funded by the Cap-and-Trade Program, SB 1, Proposition 1A and other California High-Speed Rail Authority funding.

In addition, in September 2019, the Board identified the preferred alternatives for the San Francisco to San José and San José to Merced project sections. This sets the stage for completing the draft environmental documents for these project sections. In the meantime, we continue to engage with communities along the alignment on mitigating potential impacts.

PROGRESS ON HIGH-SPEED RAIL IN NORTHERN CALIFORNIA

In Northern California, portions of the high-speed rail system are at various stages of development—complete and open for service to the earliest stages of planning. Each stage is essential to completing the Silicon Valley to Central Valley Line, and significant progress has been made since 2018.

CALTRAIN ELECTRIFICATION PROGRESS

The Authority committed \$714 million to Caltrain's Peninsula Corridor Electrification Project, nearly 40 percent of the total \$2 billion cost. The project, scheduled to be completed in 2022, will electrify and upgrade the current Caltrain corridor, improving performance, operating efficiency, capacity, safety and reliability between San Francisco and San José.

An electrified Caltrain corridor is a critical component of bringing high-speed rail services to the Bay Area. The current construction will enable high-speed rail trains to reach San Francisco by sharing tracks with Caltrain. The landmark agreement that established the blended system in 2012 has led to a successful partnership between Caltrain and the Authority. This investment will increase Caltrain service, reduce emissions by 97 percent and allow for better service up and down the Peninsula.

The project has made significant progress in construction as foundations have been poured, poles have been erected and work began on stringing the catenary system wires. Caltrain expects to see additional project milestones in 2020, including the arrival of the first new electric trains on Caltrain property and the advancement of construction to more parts of the corridor.

SAN MATEO 25TH AVENUE GRADE SEPARATION PROJECT

We partnered with the City of San Mateo, San Mateo County and others to construct the 25th Avenue Grade Separation, a project which ranked sixth in the California Public Utilities Commission's priority safety list. The project was designed to accommodate additional passing tracks in the future. In addition to reducing congestion and

improving safety, the project will build a new elevated Caltrain Hillsdale Station with updated amenities at E. 28th Avenue. The \$180 million project, managed by Caltrain, will raise tracks, lower E. 25th Avenue, and create new grade separated east-west connections at 28th and 31st Avenues.

This will improve safety for both motorists and pedestrians, reduce local traffic congestion and reduce train noise for residents. The project conforms with the San Mateo Rail Corridor Transit Oriented Development Plan. We contributed up to \$84 million and serve in an oversight role on the project. This project is more than 50 percent complete and is expected to open by January 2021.

"By building high-speed rail, we will be able to reduce traffic jams and gridlock, as well as our carbon footprint. 29% of greenhouse gas emissions in the U.S. come from the transportation sector. That number is 41% in California. High-speed trains also provide a faster total travel time than driving or short flights."

— Congressmember Ro Khanna (CA-17)

SALESFORCE TRANSIT CENTER

The northern terminus of the high-speed rail system, the Salesforce Transit Center, opened in 2018. The transit center includes a train box at the basement level where both high-speed and Caltrain service will arrive. The train box was funded by \$400 million in federal ARRA funds for high-speed rail systems. This project was managed

by the Transbay Joint Powers Authority (TJPA), of which the Authority is now a member. Since opening in 2018, the center had to address cracks in steel beams, which have now been repaired. Bus operations, park facilities on the roof and, soon, a substantial retail presence will make the transit center a marquee destination in San Francisco (**Exhibit 3.7**).

Exhibit 3.7: Salesforce Transit Center



PROPOSITION 1A CONNECTIVITY PROJECTS

In addition to the bookend projects funded by SB 1029, an additional \$950 million in Proposition 1A funds are constructing 18 other projects in Northern and Southern California. These projects improve existing state passenger rail systems today

and provide improved connectivity to high-speed rail investments in Northern California. Managed through the California Transportation Commission, the 10 projects in Northern California total \$543 million.

Table 3.3 summarizes the Northern California projects and the status as of December 2019.

TABLE 3.3: Northern California Connectivity Projects' Status (\$ in Millions)

Sponsor	Name	Completion Date	Funding
San Joaquin Corridor	Positive Train Control	Completed	10
Capitol Corridor and Altamont Corridor Express	Travel Time Reduction	June 2020	10
San Joaquin Corridor	Merced to Le Grand Double Track	October 2020	41
Capitol Corridor	Sacramento to Roseville 3rd Main Track Project	September 2022	52
Sacramento Regional Transit	Intermodal Facility Improvements	June 2022	30
Peninsula Corridor Joint Powers Board (PCJPB)	Caltrain Advanced Signal System/Positive Train Control	October 2020	105
San Francisco Municipal Transportation Agency	Central Subway	December 2020	61
San Francisco Bay Area Rapid Transit (BART)	Millbrae Station Track Improvement and Car Purchase	May 2026	140
San Joaquin Regional Rail Commission (SJRRC)	Stockton Passenger Track Extension	June 2022	15
San Francisco Bay Area Rapid Transit (BART)	Maintenance Shop and Yard Improvements	January 2024	79
Total Funding			543

ADVANCING PROJECT DEVELOPMENT

Over the next two years, both the Authority and our partners will take several significant actions to prepare for the next phases of high-speed rail development in Northern California.

COMPLETING ENVIRONMENTAL DOCUMENTS

In September 2019, the Authority's Board of Directors identified preferred alternatives for the two high-speed rail project sections in Northern California that will complete the Silicon Valley to Central Valley Line. Identifying the preferred alternatives was the critical last piece that the Authority needed to finalize the Draft Environmental Impact Report/Environmental

Impact Statement (Draft EIR/EIS) for each project section after more than 10 years of study.

In the San Francisco to San José project section, the Board identified a preferred alternative that utilizes a blended configuration between San Francisco and San José within the existing Caltrain corridor. This alternative includes a light maintenance facility on the east side of the tracks in Brisbane and does not include additional passing tracks. This project section includes a station at the Salesforce Transit Center and 4th and King in San Francisco, a station at Millbrae and the Diridon Station in San José.

In the San José to Merced project section, the Board identified a preferred alternative that utilizes a blended configuration between San José and Gilroy in the existing Caltrain and Union Pacific Railroad corridors before continuing to a dedicated high-speed rail alignment through Pacheco Pass. This project section includes the Diridon Station in San José, a station at Gilroy and a station at Merced.

With the Board’s identification of the preferred alternatives, staff is now finalizing the draft environmental documents for public review. It is important to note that all alternatives will be evaluated equally in the draft environmental documents. As these documents are being completed, staff continues to coordinate and work with stakeholders on the development of the preferred alternatives to address any issues, concerns and impacts of the project. A 45-day public comment period follows the release of the draft environmental documents, during which the Authority’s outreach team will hold open houses and a public hearing in each project section. Final route decisions after all input has been taken into consideration will be made at the end of the environmental review process.

The Draft EIR/EIS for both project sections are planned to be released in early 2020 and final documents are anticipated to be completed in 2021 (see **Table 3.4**). Completing the environmental documents will allow the Authority to move forward towards construction as funding is identified.

Table 3.4: Schedule for Completing Environmental Documents

Project Segment	Draft EIR/EIS	Revised ROD Date
Central Valley Wye (Merced to Fresno)	Complete	September 2020
San José to Merced	April 2020	May 2021
San Francisco to San José	June 2020	August 2021

■ DOWNTOWN EXTENSION PROJECT

The Downtown Extension Project (DTX) will connect the existing rail network from 4th and King into the Salesforce Transit Center. This will allow both Caltrain and California High-Speed Rail Authority trains to access the area constructed for rail within the transit center.

This project reached important milestones in 2019, receiving the approval of the Supplemental EIR/EIS for the 1.3-mile tunnel project. Additionally, the San Francisco County Transportation Authority led an effort in 2019 to review the governance and project delivery approach for DTX and

recommended a multi-agency team (including the Authority) be established to help oversee the continued development of the project. The goal is to get the DTX ready for construction in the next two years.

PLANNING FOR DIRIDON STATION

Over the past year, the Santa Clara Valley Transportation Authority (VTA), the City of San José, Caltrain and the Authority have worked to develop the first phase of the Diridon Integrated Station Concept (DISC)—a shared vision for the future spatial layout of Diridon Station as an intermodal hub that integrates with the surrounding community and supports the growth anticipated with Google’s transit-oriented village plan. This has been an early conceptual planning process, in which we have been one of four partner agencies working under a cooperative agreement to form a collaborative process for station planning.

Diridon Station is the primary transit hub of the South Bay, currently serving approximately 17,000 daily passengers and anticipated to grow to more than 100,000 passengers per day by 2040. The station currently connects Caltrain, the Capitol Corridor, the Altamont Commuter Express (ACE) and Amtrak passengers with VTA light rail and bus service, as well as other regional bus transportation providers. Diridon Station is the major hub of the high-speed rail system in Silicon Valley due to its important connectivity to downtown San José and the rest of the Bay Area. Bay Area Rapid Transit (BART) also has plans to extend service from the new Berryessa station to Diridon by 2030, further increasing connectivity and ridership.

DISC envisions the gradual transformation of the station area from a predominantly auto-orientation to a transit-oriented, world-class multimodal transit hub and gateway to Silicon Valley. The planning

effort seeks to leverage billions of dollars spent on transit systems and connectivity to maximize transit ridership, reduce auto dependence, create travel choice and attract investment. The partner agencies developed a unified vision for the spatial layout of the station. The next phases of work will include developing a cohesive strategy for investment at the station and the broader station area.

The key objectives for Diridon Station include:

- A multimodal, integrated and human-centered station;
- A catalyst for the urban environment;
- A destination; and
- A futureproof, flexible, adaptive and innovative station.

Phase One included a report on partner agency ambitions and requirements, an assessment of heavy-rail needs, screening criteria, development of three optimized layouts and an interactive evaluation process that led to a preferred spatial vision. Phase 2, with an anticipated start in early 2020, will continue to build on the spatial vision while also advancing work focused on how the agencies will organize themselves to deliver that vision. Key features for the spatial configuration are:

- An elevated station concept;
- Station concourse locations oriented toward Santa Clara Street & San Fernando Street; and
- Maintaining track approaches primarily within the existing rail corridor north and south of the station.

Over the next year, a critical planning focus will be on studying the best options to organize the Partner Agencies and technical expert teams, building a viable financial plan, developing

environmental strategies, and designing an implementation path to build and govern the future station. The conceptual design work will result in updated conceptual engineering drawings to define the concept layout, capital cost estimates, conceptual construction sequencing passenger flow analysis, and refined station footprint. There are many critical decisions ahead, and the next course of work will focus on how to take the spatial vision of the concept layout forward through project development sufficient for environmental evaluation, and eventually implementation.

LOOKING AHEAD: STRATEGIC OPPORTUNITIES

Several strategic investments will advance the program toward construction and maintain momentum toward completion of the Silicon Valley to Central Valley Line. Advancement of these activities will position the Authority for the next phase of construction.

STRATEGIC RIGHT-OF-WAY ACQUISITIONS

Even before we can fully fund the Silicon Valley to Central Valley Line, it is important to identify opportunities to acquire right-of-way as appropriate. To that end, we are working closely with the Union Pacific Railroad (UPRR) and the California State Transportation Agency (CalSTA) to reach an agreement that would enable high-speed rail services to operate in the corridor currently owned by UPRR from San José to Gilroy. Improvements to this corridor would also give Caltrain the ability to extend electrified service south of San José and provide bidirectional, all-day service, something that Caltrain set out in its adopted long-range service vision.

We also continue to work with partners in the Millbrae area. The high-speed rail project will require parcels along the west side of the

existing Millbrae-SFO BART station for high-speed rail facilities, access, and replacement for displaced parking. The City of Millbrae has approved development plans in this area and a joint approach to meet all needs at the site would be desirable. Our plans do not preclude future additive development on this site if such plans are ultimately approved.

We are also focused on other areas for strategic right-of-way procurement where early works or development pressure may require corridor preservation ahead of construction. These areas include:

- The Brisbane light maintenance facility location, in coordination with the build-out of the Baylands development;
- Properties surrounding the Diridon Station, where development is planned but additional land is needed for the rail corridor; and the
- Pacheco Pass for the relocation of the Pacheco water conduit in coordination with the Santa Clara Valley Water District. This would facilitate work on the water conduit ahead of required construction at this location.

Additionally, we will need to work with the VTA and Caltrain on the development of the rail corridor between San José and Gilroy. VTA owns property at the Tamien, Capitol, Blossom Hill, Morgan Hill and San Martin. Caltrain owns the Gilroy station and is responsible for the Caltrain service to Gilroy. As such, we will need to develop arrangements for the build-out of the corridor, the associated high-speed rail facilities and the facilities at intermediate stations between San José and Gilroy.

THIRD-PARTY AGREEMENTS

Throughout the development of the preliminary engineering and environmental analysis, our regional teams have coordinated with stakeholders with assets in the study area and with federal, state and local agencies. We have provided all participants with the preliminary engineering plans for review to confirm or update the type and location of assets intersected by the proposed project. We then adjusted the project footprint to account for modifications to the third-party facilities.

We have executed nearly 30 third-party agreements in Northern California, including agreements with cities or counties, utilities and irrigation/water districts. Agreements continue to be developed with other third-parties including utilities (water, gas, power, etc.) for relocations, with cities for construction within their jurisdictions and, where applicable, other entities, such as irrigation and/or water districts. These agreements need to be in place ahead of construction and are best developed after a specific project is approved and additional design is completed.

PRELIMINARY ENGINEERING FOR PROCUREMENT

Prior to releasing civil construction procurement, there is a need to refine engineering plans for construction. A key element to this refinement is additional geotechnical investigations associated with tunneling through the Pacheco Pass. These investigations will be located at mass grading locations for tunnel portals and for complex structures throughout the San José to Merced project section. This work is critical to identify underground conditions. This information will reduce the risks faced by contractors during construction and will help inform refinements

to our cost estimates for the work in this critical project section.

Additional work will also include refining designs for utility and other third-party requirements. This will help to refine right-of-way acquisition requirements and utility relocation prior to procurement.

FASTER BAY AREA INITIATIVE

Significant discussions are underway on a proposed FASTER Bay Area ballot measure which is expected to raise up to \$100 billion over 40 years for transportation projects in the San Francisco Bay Area. The proposal is being led by the Bay Area Council, the Silicon Valley Leadership Group (SVLG) and SPUR (the San Francisco Bay Area Planning and Urban Research Association), in partnership with local environmental, equity and labor community groups.

The coalition's effort is inspired by recent mega measures to make substantial improvements including, Los Angeles, Measure M and ST3 in Seattle—each generating billions for public transportation investments. The FASTER Bay Area ballot measure could focus on creating transit hubs to connect major cities around the region by rail, as well as building public transit options in currently underserved communities.

Because the source of revenue is a sales tax increase, placing the measure on the ballot for all nine Bay Area counties requires the Legislature to pass a bill granting taxing authority to a regional agency. Only after that legislation is passed can the measure be put on the ballot. Proponents hope that the measure will appear on the ballot as early as November 2020.

SHARED CORRIDOR PARTNERSHIPS AND JOINT FUNDING OPPORTUNITIES

If it passes, the FASTER Bay Area measure would create an opportunity for the Authority to collaborate further with regional partners on prioritizing, funding and implementing critically needed transportation investments in the Bay Area.

High-speed rail offers a fast, efficient and reliable interregional travel option linking the Bay Area to the Central Valley and to Southern California population and employment centers. The regional benefits of high-speed rail, such as congestion relief, increased regional job accessibility, reduced greenhouse gas emissions and support for sustainable communities, are maximized by capacity expansion, station modernization, multimodal station access and investments in regional rail network integration.

The Authority would endeavor to develop funding partnerships, such as matching state and federal funds with regional funds, to help leverage investments that would move toward completing the Silicon Valley to Central Valley Line. These combined investments would improve mobility within the Bay Area, particularly along shared corridors where Caltrain and the Authority will jointly operate.

CLOSE THE GAP

The key element to closing the gap to the Bay Area is funding. Our advocacy for additional funding at the state, federal and local level will be centered around using any newly available funds to close the gap so we can complete the Silicon Valley to Central Valley service from San Francisco to Bakersfield.

We will do what we can until additional funding is identified. This could include moving forward on hardship and/or strategic right of way purchases or activities related to tunnel engineering through the Pacheco Pass. These tunnels present the greatest challenges in terms of environmental planning, cost, technical complexity, schedule and available funding to complete.

Our mission is to complete project-development work to refine the design, scope and costs in this region. And, to the extent we can conduct important early works, such as geotechnical analysis, to reduce uncertainty and further "de-risk" future construction. This will include engaging private- and public-sector expertise to examine and refine design options, optimize operational efficiency, limit costs and evaluate delivery options.

"Facing physical constraints that prohibit further runway expansion, SFO looks to California High-Speed Rail as a means to accommodate future growth, by providing an effective alternative to air travel between Northern and Southern California. California High-Speed Rail, and the connection at Millbrae, is a critical element to ensure that SFO can continue to serve as an economic engine for our region."

— Ivar C. Satero, Airport Director, SFO



UNION STATION
UNION STATION
UNION STATION

 Metro

 AMTRAK

METROLINK

FIRST 5 LA

Photo: Los Angeles Union Station

SOUTHERN CALIFORNIA

Today, \$1.3 billion of Proposition 1A and other California High-Speed Rail Authority funding is already at work in Southern California in shared corridor investments.



MOVING FORWARD IN SOUTHERN CALIFORNIA

The \$1.3 billion commitment includes \$363 million to complete the environmental work between Bakersfield and Anaheim, setting the stage for increased rail service by Metrolink, Los Angeles–San Diego–San Luis Obispo (LOSSAN) and high-speed rail in the Burbank-Anaheim corridor. In addition, we contributed \$18 million to the environmental review of Link Union Station (Link US) Project and will complete a funding plan to contribute the remaining \$423 million of bookend funds toward Phase A station improvements. In early 2018, we secured a joint funding agreement for the \$77 million Rosecrans/Marquardt Grade Separation Project at one of the most dangerous grade crossings in the state. In addition, Proposition 1A funds support the construction of nearly \$400 million in connectivity projects supporting regional services. These funding commitments are part of \$4.4 billion in state awards to public transit and rail projects in Southern California funded by Cap-and-Trade, SB 1, Proposition 1A and other California High-Speed Rail Authority funding.

We have been working with partner agencies, corridor cities, stakeholders, community members, and local and state leaders to advance environmental clearance of the four project sections in Southern California: Bakersfield to Palmdale, Palmdale to Burbank, Burbank to Los Angeles, and Los Angeles to Anaheim. In late 2018, our Board of Directors identified preferred alternatives for all four project sections, setting the stage for issuing Draft Environmental Impact Reports/Environmental Impact Statements (Draft EIR/EIS) for all the project sections.

A new development since the 2018 Business Plan has been the progress and funding approvals related to a new high-speed rail developer and

operator within the state—Virgin Trains USA. They are developing a high-speed rail line from San Bernardino County, California, to Las Vegas, Nevada, of which approximately 130 miles will be built in California on existing Caltrans’ right of way along Interstate 15. We will be working with them to explore and evaluate our mutual interests going forward.

PROGRESS ON HIGH-SPEED RAIL IN SOUTHERN CALIFORNIA

The Legislature committed Proposition 1A funds to fund bookend and connectivity projects throughout Southern California, which includes the Link Union Station (Link US) and Rosecrans/Marquardt Grade Separation projects. In addition, as part of our coordination with agency stakeholders, we are working closely with agencies in Southern California to complete the environmental clearances for high priority inter-related projects.

LOS ANGELES UNION STATION AND THE LINK UNION STATION PROJECT (LINK US)

Our partnership with the Los Angeles County Metropolitan Transportation Authority (Metro) on the Link US Project is a key step to implementing high-speed rail improvements in Southern California. The Link US Project involves several upgrades to Los Angeles Union Station (LAUS) in downtown Los Angeles to transform the station into a world-class facility. The partnership has reached several major milestones over the last year, such as completing an MOU and advancing a Link US Funding Plan to access the remaining bookend Proposition 1A funds.

LAUS is Southern California’s largest multimodal transportation hub, serving a region with a combined population that exceeds 20 million

people. LAUS provides Metrolink regional rail connectivity across six counties (Ventura, San Diego, San Bernardino, Riverside, Los Angeles and Orange). The station also serves the second busiest intercity rail corridor in the country, the Los Angeles–San Diego–San Luis Obispo (LOSSAN) rail corridor.

The Link US project will transform how the regional rail system operates in Southern California by allowing trains to enter and exit the station from both the existing northern tracks and new run-through tracks to the south over Highway 101. The project is anticipated to significantly increase capacity for rail service while reducing train idling times. Improvements will accommodate future high-speed rail service, with new run-through tracks dedicated to high-speed rail trains heading south toward Anaheim.

Construction on Phase A is scheduled for completion by 2026 and estimated to cost \$950 million. Phase B includes the addition of new lead tracks to the north, up to eight additional run-through tracks to the south, an elevated rail yard and a new modified and expanded at-grade concourse and passageway. This phase is projected to cost \$1.3 billion and could be completed by 2031, pending funding.

The Link US Project will greatly expand the station’s pedestrian capacity with a new expanded concourse and passageway under the tracks and new platforms, escalators and elevators. The project also includes opportunities for future transit-oriented development, improved connectivity to enhance the passenger experience, as well as design and safety improvements to US-101.

The project is expected to generate more than 200 permanent jobs, and approximately 4,500 short-term jobs per year during the anticipated 5-year construction period.

project will implement the early action/interim improvements primarily associated with regional/intercity rail run-through track infrastructure south of LAUS, with two initial run-through tracks, associated property acquisition as well as the necessary signal and roadway modifications.

Exhibit 3.8 summarizes the improvements for each stage of development. Phase A of the

Exhibit 3.8: Link US Phased Construction



Phase A			Phase B
SEGMENT 1 – THROAT AREA	SEGMENT 2 – COMMERCIAL & CENTER ST	SEGMENT 3 – VIADUCT & RUN-THROUGH	SEGMENT 4 – RAIL YARD/CONCOURSE AREA
<ol style="list-style-type: none"> 1. Rail signal, communications and track work 2. Utility relocation 	<ol style="list-style-type: none"> 1. Property acquisition 2. Utility relocation 	<ol style="list-style-type: none"> 1. Viaduct structure over US-101 (full width) 2. Two run-through tracks from Union Station Platform 4 to mainline tracks 3. Signal and communication 	<ol style="list-style-type: none"> 1. Raising of the rail yard, including new platforms and tracks, as well as new stairs, escalators and elevators 2. Proposed modified expanded passageway, including including East and West Plazas 3. Add remaining run-through tracks (10 total) and new lead track in the throat

Source: Link US Project Overview, Funding Plan Milestones and Issues for Resolution; Metro; August 2019

ROSECRANS/MARQUARDT GRADE SEPARATION

We contributed \$76.7 million to the Rosecrans/Marquardt Grade Separation Project. The Rosecrans Avenue and Marquardt Avenue intersection is considered one of the most hazardous grade crossings in the state, according to the California Public Utilities Commission. Metro, the lead agency on the project, estimates that more than 112 trains and more than 45,000 vehicles use the crossing daily.

The FRA approved the Finding of No Significant Impact (FONSI) for the Rosecrans/Marquardt project in November 2018. Metro is progressing with final design scheduled to be complete in April 2020.

Metro has completed property appraisals and started to acquire right-of-way and estimates that it will complete right-of-way acquisitions by May 2020. Metro is working closely with Southern California Edison on advancing utility relocations to clear the way for construction. A construction bid package is expected to be released by summer 2020, with construction to begin in early 2021 and the project to be complete by 2023.

Completion of these projects pave the way for high-speed rail in the future. The investment in this project also improves a significant grade crossing safety risk, improves the existing rail network and is helping California reduce auto emissions and meet environmental sustainability goals.

Exhibit 3.9 Rosecrans/Marquardt Grade Separation Project



PROPOSITION 1A CONNECTIVITY PROJECTS UNDERWAY

In addition to the bookend projects, \$389 million in Proposition 1A funds were committed to seven connectivity projects in Southern California.

Table 3.5 lists these projects and shows the Proposition 1A funding commitment to each project and the projects' status as of December 2019. Five of these projects are complete, providing regional benefits today.

Table 3.5: Southern California Connectivity Projects' Status (\$ in Millions)

Sponsor	Name	Completion Date	Funding
Southern California Regional Rail Authority (SCRRA)	Positive Train Control; Moorpark to San Onofre	Completed	47
North County Transit District (NCTD)	Positive Train Control; San Onofre to San Diego	Completed	42
California Department of Transportation (Caltrans)	Positive Train Control; Los Angeles to Fullerton	Completed	3
Southern California Regional Rail Authority (SCRRA)	MetroLink Positive Train Control	Completed	35
Los Angeles County Metropolitan Transportation Authority (Metro)	Regional Connector Transit Corridor	October 2021	115
Southern California Regional Rail Authority (SCRRA)	MetroLink High-Speed Rail Readiness Program	March 2022	89
San Diego Association of Governments (SANDAG)	Blue Line Light Rail Improvements	Completed	58
Total Funding			389

ADVANCING PROJECT DEVELOPMENT

High-speed rail planning is moving forward in Southern California. As part of our federal American Recovery and Reinvestment Act (ARRA) grant agreement, we will complete environmental documents to be ready for future construction. In Chapter 4, we discuss approaches to move forward to seek additional funds. As funds are available, we will be evaluating what investments help us move forward on our goal to complete the Phase 1 system. In Southern California, that will include assessing how incremental improvements can be made to further the vision of electrified high-speed rail service.

COMPLETING ENVIRONMENTAL DOCUMENTS

Over the next two years we will complete the remaining environmental work that sets the stage for pre-construction activities. In October and November 2018, the Authority's Board of Directors concurred with staff's preferred alternative recommendations for all high-speed rail routes in Southern California:

- In October, the Board considered four alternative alignments in the Bakersfield to Palmdale section, and Alternative 2, including a Cesar Chavez National Monument Design Option, was identified.
- In November, the Board considered three alternative routes through the Palmdale to Burbank project section. The preferred alternative identified was a Refined SR 14 alignment.

- In November, the Board concurred with the remaining three project section preferred alternatives which included:
 - Burbank to Los Angeles and Los Angeles to Anaheim—As these two sections are primarily within existing railroad rights of way, two alternatives, a No Action and a Project Alternative, were considered. Staff recommended the Project Alternative in both project sections.

With identified preferred alternatives, work is underway to prepare draft environmental documents for public review. It is important to

note that although the Board identified these preferred alternatives, all alternatives are being evaluated equally in the draft environmental documents. A 45-day public comment period will follow the release of the draft environmental documents, during which we will hold open houses and public hearings in each project section. The Board will make final route decisions at the end of the environmental review process.

The Draft EIR/EIS documents for each project section are planned to be released in 2020 and final documents will be completed by December of 2021 (**Table 3.6**).

Table 3.6: Schedule for Completing Environmental Documents

Project Segment	Draft EIR/EIS	Revised ROD Date
Bakersfield to Palmdale	March 2020	April 2021
Burbank to Los Angeles	May 2020	June 2021
Palmdale to Burbank	December 2020	January 2022
Los Angeles to Anaheim	January 2021	February 2022

MOVING FORWARD WITH LINK US CONSTRUCTION

We have partnered with Metro on Link US environmental clearance since 2016. The state California Environmental Quality Act (CEQA) process was completed in July 2019. The federal National Environmental Policy Act (NEPA) clearance is expected to be complete in 2021 under the Authority's NEPA Assignment process.

In September 2019, the Authority, the California State Transportation Agency (CalSTA) and Metro reached an agreement to direct the remaining \$423 million in Southern California Proposition 1A bookend funds toward the Link US Project. Under this agreement, the three agencies, along with the Southern California Regional Rail Authority (SCRRA), will establish a Link US Executive Steering Committee to coordinate and facilitate project delivery.

The Link US Executive Steering Committee has three main functions:

- Bring executive alignment among the Link US Project's major funding partners;
- Make key decisions on Link US Project features through final design and construction; and
- Set major Link US delivery milestones.

We expect to complete a Project Management and Funding Agreement (PMFA) for the project with Metro by the end of 2020.

COMPLETION OF PROJECT MANAGEMENT AGREEMENTS

The Authority will continue to work with partners to complete Project Management Agreements associated with funding partnerships for

Proposition 1A Bookend investments. These include detailed agreements related to the construction of Link US, clarifying roles and responsibilities between the various partners on this major facility expansion. This will also include additional discussion related to the Rosecrans/Marquardt grade separation project which will begin construction. These projects comprise the \$500 million in bookend funding dedicated to Southern California through Proposition 1A.

LOOKING AHEAD: STRATEGIC OPPORTUNITIES

There are several strategic investments that will be considered to advance the program toward construction and maintain momentum in Southern California. Advancement of these activities will incrementally continue to advance the program as funding is identified. The following are some examples of activities that would provide joint benefits and would advance the program once environmental documents are complete.

PRELIMINARY ENGINEERING FOR PROCUREMENT

This corridor includes significant tunneling and prior to releasing civil construction procurement, additional information is necessary to further engineering plans. This includes refining proposed designs and advancing work on utility and other third-party agreements. This will allow us to refine right-of-way acquisition requirements and define early utility relocation work.

This work would also involve critical detailed geotechnical investigation to better define tunneling conditions. This will help refine designs and provide information that can help to reduce the risk associated with tunnel construction. Advancing engineering to the level necessary to

support the construction procurements will be a critical part of pre-construction activities.

We will also continue the ongoing groundwater monitoring through the San Gabriel Mountains. This work is being done to develop a multi-year analysis of variations in groundwater conditions along the high-speed rail alignment. This will be used to support approval from the U.S. Forest Service to start construction when funding becomes available.

GRADE SEPARATION PROJECTS

We have been coordinating with local agencies to advance grade-separation projects at specific locations south of Bakersfield. These projects provide important short-term safety and traffic operational benefits but also prepare for future high-speed rail construction. Some examples of projects that are currently being environmentally cleared as part of the high-speed rail program include the following:

- Morning Drive (SR-184) at the UPRR along Edison Highway on the eastern edge of Bakersfield;
- Rancho Vista Boulevard at the UPRR and Sierra Highway in the City of Palmdale; and
- Palmdale Boulevard at the UPRR and Sierra Highway in the City of Palmdale.

TREATMENT PLANT UPGRADES FOR CONSTRUCTION

The Bakersfield to Palmdale section passes through arid lands where natural water sources are limited. Our Sustainability Policy sets forth our sustainability priorities and reiterates our commitment to "reduce potable water use in design, construction, and operation to the maximum extent practicable." Generally, wastewater that has been treated to

a tertiary level to be sufficient quality to support construction activities.

The City of Lancaster and the City of Palmdale operate treatment plants that treat wastewater to a tertiary level, and this water could be used for construction purposes with minor upgrades to the existing infrastructure to transport the treated water to the high-speed rail alignment. The City of Tehachapi operates a treatment plant that currently provides secondary treatment and is working on a project to upgrade the treatment plant to a tertiary level of treatment.

We are in preliminary discussions with the City of Tehachapi pertaining to an agreement under which we might participate in the treatment-plant upgrade in exchange for guarantees of future water supplies. The unincorporated community of Rosamond also operates a treatment plant that currently provides secondary treatment. An agreement like the one being discussed with Tehachapi could also be feasible for Rosamond. Because the treatment-plant upgrades will take several years to complete and become operational, it is important that these discussions occur soon so that water for construction can become available when needed.

BNSF PARTNERSHIP

The Los Angeles to Anaheim project section is an extremely constrained existing three-track rail corridor, with roads, overpasses, businesses and homes abutting nearly every mile of the rail right of way. The corridor also is heavily used by existing diesel passenger and freight rail, which interoperate on the three tracks. Preliminary plans to add electrified high-speed rail tracks in this corridor involved adding two new dedicated electric tracks roughly parallel to the existing tracks, which would require a meaningful widening of the existing right-of-way into existing roads, buildings and homes.

Through a partnership with BNSF Railway (BNSF), CalSTA and regional rail providers, a concept was developed to accomplish largely the same capacity results with a four-track configuration (two freight and two electrified passenger) that will fit mostly inside the existing right of way, thereby reducing impacts in the main corridor. Offsetting the capacity lost by reducing freight to two tracks will require new facilities to be constructed in the Inland Empire. These facilities include the Lenwood Staging Tracks near Barstow and the Colton Intermodal Facility.

VIRGIN TRAINS USA

The development of high-speed train service between Las Vegas and San Bernardino County has been underway for more than a decade. An ownership change in 2019 created new certainty with a well-known transportation entity in Virgin Trains USA and a shift from diesel to electrified high-speed rail operations. The new ownership, Brightline, successfully developed the only privately owned, operated and maintained passenger rail system in the United States. Brightline is currently operating service between Miami and West Palm Beach and expects to begin operations between Miami and Orlando in 2022. This private developer represents a significant introduction of high-speed rail in the Southern California region and presents the potential for exciting synergy between our two systems, including higher ridership potential and the possibility of bringing high-speed rail benefits to Southern California sooner.

As early as 2010, the State of California was working with this private entity to explore and evaluate ways to coordinate planning. In 2016, we contributed to a report to prepare ridership and revenue forecasts of a rail link connecting San Bernardino County with the California high-speed rail station in Palmdale. The study determined that a high-speed rail link would provide a "viable and attractive alternative" to existing transportation modes along this corridor.

In January 2019, we joined CalSTA and Caltrans to collaborate with Virgin Trains USA and its affiliates through a Memorandum of Understanding (MOU). This agreement outlines our intent to work together, share information and explore opportunities for joint procurements and interoperability on both systems. Through the MOU, we will coordinate with Virgin Trains USA's efforts to develop a connection between Palmdale and San Bernardino County in the future. This

connection would ultimately link our services connecting California with Nevada.

California, Nevada and the federal government are assisting Virgin Trains USA to obtain tax-exempt private activity bonds to help fund this private development and construction. In the fall of 2019, California took two significant actions through the California Debt Limit Allocation Committee and the California Infrastructure and Economic Development Bank to lower Virgin's cost of capital to finance construction of the project.

The project includes the design, development, acquisition, construction, installation, equipping, ownership, operation, maintenance, renovation and administration of an intercity high-speed rail line capable of reaching speeds of up to 180 miles per hour. It also includes the purchase of train cars and locomotives, electrification of the infrastructure and construction of a passenger station and other related facilities in Victor Valley in San Bernardino County. This is expected to create approximately 15,900 construction jobs, and, when complete, will employ 404 full- and part-time workers. Annually, the project anticipates approximately \$46.9 million of economic activity in San Bernardino County, \$17.3 million in labor income and \$4.8 million in federal, state and local tax revenue. It is estimated to provide significant environmental benefits as well by removing 2.8 million car trips annually, eliminating 100,000 metric tons of carbon emission from the Interstate 15 corridor.



Photo: Brightline Train

Virgin Trains USA and California High-Speed Rail Collaboration:

The January 2019 MOU with Virgin Trains USA lays out an agreement to:

- Evaluate opportunities to extend to Palmdale, California, and interconnect with the California high-speed rail system;
- Share information on designs, operations, ridership and construction data to evaluate interoperability; and
- Evaluate and identify joint purchasing opportunities for materials and possibly rolling stock and reservation/ticketing systems.

This is an example of how the high-speed rail program continues to meet Proposition 1A's original intent—to explore opportunities for private investment. This unique opportunity demonstrates the potential for future private participation in funding the system.

CLOSE THE GAP

Our ability to continue to develop the Southern California program is dependent on additional funding being identified. Our advocacy for additional funding at the state, federal and local level will be centered around using any newly available funds towards strategic opportunities that help to close the gap.

This region has the most significant and technically challenging elements of California's high-speed rail program. Tunneling through the Tehachapi Mountains between Bakersfield and Palmdale, and the San Gabriel Mountains between Palmdale and Burbank will require significant engineering and construction planning. The alignments currently under consideration involve between 45 to 50 miles of tunneling in varying lengths, and sections which are more than 2,000 feet underground.

We will continue to assess our priorities to continue to progress the designs, scope and cost estimates for this region. Much like our approach in Northern California, we hope to conduct important early works, such as geotechnical analysis and other pre-construction work such as third-party agreements and strategic right-of-way opportunities once environmental documents are complete. Finally, we will engage private and public sector expertise to examine and refine design options, optimize operational efficiency, limit costs and evaluate future delivery options.

"Virgin Trains looks forward to continued collaboration and coordination with the State of California and the counties of Los Angeles and San Bernardino to bring fast, efficient and electrified high-speed rail between Las Vegas and Southern California, providing a sustainable travel option for the millions of travelers between these great destinations."

— Sarah Watterson
Executive Vice President, Head of Development
Virgin Trains USA

HIGH-SPEED RAIL CONSTRUCTION

Putting America to Work

THIS PROJECT FUNDED BY:

HIGH-SPEED PASSENGER TRAIN BOND PROGRAM
AMERICAN RECOVERY AND REINVESTMENT ACT
GREENHOUSE GAS REDUCTION FUND



BE WORK ZONE ALERT



Photo: Bond Program, American Recovery and Reinvestment Act, Greenhouse Gas Reduction Fund sign

COSTS AND FUNDING TO DELIVER THE PHASE 1 SYSTEM

Chapter 3 reaffirmed our recommendation to develop the first 171-mile electrified high-speed rail building block between Merced to Bakersfield and discussed the costs and funding that has been committed to date that make it affordable.

This chapter updates the capital cost estimates for the Silicon Valley to Central Valley Line and for completing the Phase 1 system and summarizes the federal and state funding that has been committed to the program to date. Given that the Phase 1 system is not yet fully funded, this chapter also describes potential options for closing the remaining funding gaps between the Central Valley, the Bay Area and south into the Los Angeles Basin, with a focus on financing and opportunities incorporating private sector involvement.

The funding options described in this chapter would serve to expand high-speed rail in California and continue the State's role as a funding partner for high priority regional rail and public transit projects throughout California.

CAPITAL COST ESTIMATES

The capital cost estimates shown in this Draft 2020 Business Plan have not changed significantly since those presented in the 2018 Business Plan. These new estimates reflect three updates:

- **New Estimate-at-Completion (EAC) for Central Valley Segment in 2019 Project Update Report:** After the 2018 Business Plan, several cost and risk reviews were

CHAPTER 4

conducted, including a Monte Carlo risk analysis applied to the 119-mile Central Valley Segment, an independent cost review by the Early Train Operator (ETO) and an EAC exercise. As a result of these reviews, our 2019 Project Update Report increased our Program Baseline for the Central Valley Segment by \$1.8 billion to reflect scope changes, higher cost estimates and added contingency. This Draft 2020 Business Plan reflects that \$1.8 billion change announced last May and is now applied to the Silicon Valley to Central Valley Line and the Phase 1 system cost estimates.

- **Including Merced Extension costs in Silicon Valley to Central Valley Line:** Our 2019 Project Update Report recommended building the Merced to Bakersfield line for early service. Prior to that, the costs of the section from the Central Valley Wye to Merced were accounted for in the Phase 1 cost estimates. Our updated cost estimate for the Silicon Valley to Central Valley Line

reflects the shift of the incremental capital costs associated with the Merced extension. Including Merced in this updated estimate represents a transfer of this scope and cost from Phase 1 to the Silicon Valley to Central Valley Line, not a cost increase.

- Revised schedule assumption for Silicon Valley to Central Valley Line cost estimate:** Converting capital cost estimates from current year dollar estimates to year of expenditure estimates involves making a number of assumptions including, for example, when pre-construction activities would begin and how long the project would take to construct. For purposes of developing our 2018 Business Plan year of expenditure estimate, we assumed project completion in 2029. For this Draft 2020 Business Plan, we have shifted that assumption to 2031, based on a range of factors. Notably, this change simply illustrates the effect of time on costs. In simple terms, the longer it takes to identify sufficient funding to pay for additional segments of the Phase 1 system, the more expensive it will be to construct just due to the impacts of inflation over time.

ESTIMATING YEAR OF EXPENDITURE DOLLARS

Capital cost estimates for public infrastructure projects whose construction spans multiple years are shown two ways: (1) in current year dollars, where inflation is not a factor, and (2) in year of expenditure (YOE) dollars. Year of expenditure dollars illustrate the effect of projected inflation on the cost estimates over the duration of a predicted project delivery schedule. The project delivery schedule is used as a basis to inflate capital costs

from current year estimates to year of expenditure estimates.

For purposes of developing the year of expenditure estimates, we assume that the project is financially unconstrained; in other words, that the funds required to build it are available when they are needed. To prepare our year of expenditure estimate, we assume that after the environmental Record of Decision (ROD) is issued, and the project is ready to advance into final design and then construction. The costs are loaded into the project delivery schedule and then escalated based on projected future inflation factors. This is the approach that we have used consistently in developing year of expenditure estimates.

It is important to note that a financially unconstrained schedule is not realistic, given that we do not have full funding to complete the program. However, absent any other basis for projecting when, and over what timeframe, additional funding may become available, this is the most reasonable option for calculating year of expenditure estimates. The project delivery schedule used as the basis for these estimates is illustrative and will depend on future decisions, funding availability and other factors. A full implementation timetable for delivering either the Silicon Valley to Central Valley Line or the Phase 1 system can only be accurately developed and displayed once the timing and amount of full funding is available and known.

SHOWING COST ESTIMATES IN RANGES BASED ON LEVEL OF DESIGN AND RISK

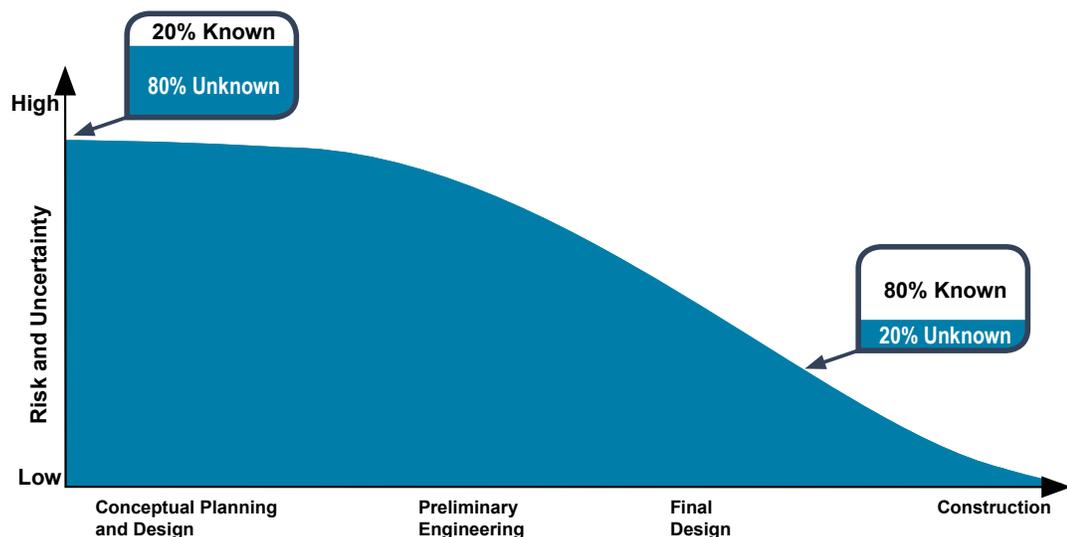
In our 2018 Business Plan, we introduced showing capital cost estimates in ranges based on where each project section is in the project design/development process. A range is the appropriate way to present these estimates given that costs will continue to evolve and change over the life of the program as more information becomes known—and more decisions are made by the Board of Directors—through advancing design and completing environmental reviews. Where project sections are more advanced, and costs are more certain, the estimates are presented in a narrower range. If design is less advanced and costs are less certain, the estimates are presented in a wider range.

DEVELOPING AND APPLYING RISK RANGES

Exhibit 4.0 illustrates how risk and uncertainty change over a project's life cycle and, with that, costs become more certain and ranges become narrower. The costs for the 119-mile Central Valley Segment, where construction is well underway, fall to the right side of the exhibit. This illustrates that risks are more fully understood and accounted for and because of that there is greater certainty on the cost to complete the project.

Costs for the remaining six project sections that comprise the Silicon Valley to Central Valley Line and the Phase 1 system, which have not been environmentally cleared, lie more toward the left side of the graphic. This reflects that more design is required and that there is still uncertainty about alignment and other scope decisions which will be made at the time of the environmental ROD. It also reflects that until more is known through engineering and more decisions are made, there remains greater uncertainty about potential risks and costs. This cost/risk uncertainty is captured and reflected in the wider range of cost estimates.

Exhibit 4.0: Risk and Uncertainty Timeline



Modified version of Project Management Institute, A Guide to the Project Management Body of Knowledge (PMBOK Guide) - Fifth Edition, Project Management Institute, Inc.



Rendering: Elevated high-speed rail in Bakersfield

The ranges that we established for these project sections are based on industry standards that reflect the current level of design development. The ranges are based on estimate classifications by AACE International (Association for the Advancement of Cost Engineering) and vary depending on the complexity of the project scope elements, maturity of underlying technical baseline information and the inclusion of appropriate contingencies. The ranges assume a general level of risk based upon each project section's level of development which was applied as an overlay to the estimate.

We will continue to express the capital cost estimates in ranges until we have the detailed project level information upon which we can develop clearly defined scope, contracts, budgets and procurements. This approach will continue to shape our decisions and our strategy for how we plan, manage and implement the system over time.

COST/RISK RANGES FOR SILICON VALLEY TO CENTRAL VALLEY AND PHASE 1 PHASE ESTIMATES

Except for the Central Valley Wye, 171 miles of the Silicon Valley to Central Valley Line have been environmentally cleared and 119 miles are under construction. The remaining two project sections, San Francisco to San José and San José to Merced, have advanced to approximately the 15-percent design stage and are still undergoing environmental review with draft environmental impact statements scheduled for release in early 2020 and final environmental clearance by 2021. Preferred Alternatives for these sections were identified by the Board of Directors in September 2019.

Similarly, in Southern California, all four remaining Phase 1 project sections between Bakersfield and Anaheim have also advanced to at least 15-percent design and are still undergoing environmental review, with RODs scheduled in 2021 and 2022. These sections include Bakersfield to Palmdale, Palmdale to Burbank, Burbank to Los Angeles and Los Angeles to Anaheim. Preferred Alternatives for these sections were identified by the Board of Directors in October and November 2018.

It should be noted that, in 2018, we initiated the practice of identifying preferred alternatives before releasing draft environmental documents. This practice was adopted to communicate to the public what alternative appears to be the most practicable based on all analysis completed and all public input received to date. Identifying preferred alternatives before releasing the draft environmental documents allows the public to focus their attention and comments on that alternative, if they choose. It is important to note, however, that all remaining alignments are evaluated equally in the draft environmental documents and that final route decisions, which are not made until the end of the environmental review process, will consider public input on all alternatives.

Additional analysis, design and engagement with local communities and stakeholders continues on these six remaining project sections as well as on the Central Valley Wye. Through that process, changes in scope and even changes in preferred alternatives are possible as the environmental process proceeds toward final approval. To reflect that significant changes could still occur between the identification of preferred alternatives and final scope/alignment decisions, we are maintaining—as we did in our 2018 Business Plan—a base cost estimate with a wide range for the Silicon Valley to Central Valley Line and full Phase 1 cost

estimates. These ranges capture the potential costs associated with final alignment decisions and remain appropriate at this step of project development/decision-making. The range of cost estimates should narrow when RODs are approved in the coming two years.

SILICON VALLEY TO CENTRAL VALLEY COST ESTIMATE

As discussed above, this updated cost estimate reflects three adjustments:

- The \$1.8 billion adjustment to the Central Valley Segment cost estimate made in May 2019;
- Shifting the scope and incremental civil and vehicle costs for the Merced extension from Phase 1 (\$2.0 billion); and
- A revised schedule assumption escalating the YOE estimate by \$1.3 billion.

Consistent with the 2018 Business Plan, the cost estimate for this line assumes a "light" initial capital investment to extend passenger service from San José to the Caltrain station at 4th and King Street in San Francisco to allow for a one-seat ride into San Francisco. The remaining capital costs associated with delivering full service to the Salesforce Transit Center in downtown San Francisco are included as part of the Phase 1 estimate.

Table 4.0 provides the updated capital cost estimates for this line in current 2019 dollars and YOE dollars broken down by Federal Railroad Administration (FRA) Standard Cost Categories. It includes the Central Valley Segment adjustment made in 2019 and shows the incremental capital costs associated with shifting the Merced Extension to this phase. For purposes of developing the year of expenditure estimate, a project delivery schedule of 2031 was assumed.

Table 4.1 shows a summary of the year of expenditure cost estimate in ranges by project section. The ranges vary based on the current cost estimating risk and uncertainty associated with each project section. The estimate shows incremental cost of shifting the Merced Extension to this phase.

Adding Merced to the Silicon Valley to Central Valley Line:

In our 2019 Project Update Report, we recommended the Merced to Bakersfield line for interim service. The incremental infrastructure cost for the Merced Extension to the Central Valley Segment (north of Madera Acres to Merced) is \$2.5 billion, as shown in Chapter 3 of this Draft 2020 Business Plan.

However, in this section, the incremental infrastructure cost estimate to the Silicon Valley to Central Valley Line is approximately \$1.7 billion. That is because the first 13 miles north of Madera Acres—estimated to cost approximately \$800 million—are already accounted for in the Silicon Valley to Central Valley Line estimate and should not be double counted.

In addition, around \$0.3 billion of incremental cost for high-speed rail trainsets is required for the Silicon Valley to Central Valley with the Merced Extension. Therefore, the balance of the Merced Extension, as shown in this updated Silicon Valley to Central Valley cost estimate is shown as \$2.0 billion.

Table 4.0: Silicon Valley to Central Valley with Merced Extension Balance (2019\$ and YOE\$ in millions)

Cost Categories	2019\$	YOE\$
Track structures and track	12,086	13,349
Stations, terminals, intermodal	676	747
Support facilities, yards, shops, administrative buildings	528	583
Sitework, right-of-way, land, existing improvements	5,846	6,457
Communications and signaling	823	909
Electric traction	1,527	1,686
Vehicles	1,094	1,208
Professional services (applies to categories 10-60)	3,737	4,127
Unallocated contingency	3,190	3,523
Subtotal, Silicon Valley to Central Valley	29,506	32,589
Additional Infrastructure - Merced Extension Balance	1,436	1,667
Additional Vehicles - Merced Extension Balance	263	290
Subtotal, Merced Extension Balance	1,699	1,957
Total Silicon Valley to Central Valley including Merced Extension Balance	31,205	34,546

Table 4.1. Cost Estimate Ranges for Silicon Valley to Central Valley with Merced Extension Balance (YOE\$ in Millions)

Segment and Cost Category	Low(YOE\$)	Base(YOE\$)	High(YOE\$)
San José to Gilroy	2,252	3,340	4,826
Gilroy to Carlucci Road	8,199	10,873	13,323
Carlucci Road to Madera	2,033	2,537	2,870
Central Valley Segment	9,848	10,584	11,922
Central Valley Segment Adjustment (2019 PUR)		1,800	
San Francisco and Bakersfield Extensions	1,529	1,982	2,342
Heavy Maintenance Facility	252	265	305
Vehicles	1,025	1,208	1,253
Subtotal, Silicon Valley to Central Valley	25,138	32,589	36,841
Additional Infrastructure - Merced Extension Balance	1,417	1,667	2,000
Additional Vehicles - Merced Extension Balance	246	290	301
Subtotal, Merced Extension Balance	1,663	1,957	2,301
Total Silicon Valley to Central Valley including Merced Extension Balance	26,801	34,546	39,142

PHASE 1 SYSTEM

Table 4.2 provides the updated capital cost estimate for the Phase 1 system in current 2019 dollars and in YOE dollars broken down by the FRA Standard Cost Categories. It is inclusive of the Silicon to Central Valley Line.

Table 4.3 shows a summary of the year of expenditure cost estimate in ranges by project section. The ranges vary based on the current

risk and uncertainty associated with each project section. These estimates include everything required to complete the Phase 1 system and initiate revenue service, including trainsets and all necessary rail systems and construction of all maintenance facilities and stations. For purposes of developing the year of expenditure estimate, a project delivery schedule of 2033 was assumed.

Table 4.2: Base Cost Estimates for Phase 1 System (2019\$ and YOE\$ in Millions)

Cost Category	2019\$	YOE\$
Track structures and track	31,776	35,493
Stations, terminals, intermodal	1,985	2,217
Support facilities, yards, shops, administrative buildings	1,000	1,117
Sitework, right-of-way, land, existing improvements	14,757	16,483
Communications and signaling	1,560	1,742
Electric traction	3,767	4,208
Vehicles	4,774	5,332
Professional services (applies to categories 10-60)	7,626	8,517
Unallocated contingency	4,687	5,235
Total Phase 1	71,932	80,345

Table 4.3. Phase 1 System Cost Estimate by Project Section and Range (in Millions)

Segment	Low (YOE\$)	Base (YOE\$)	High (YOE\$)
Silicon Valley to Central Valley	25,138	32,589	36,841
San Francisco to San José	1,659	2,074	2,696
Merced to Wye	2,028	2,386	2,863
Bakersfield to Palmdale	13,076	16,345	19,614
Palmdale to Burbank	13,159	17,546	25,442
Burbank to Los Angeles	1,256	1,478	1,699
Los Angeles to Anaheim	3,049	3,587	4,125
Heavy Maintenance Facility Balance	173	216	281
Vehicles Balance	3,712	4,124	4,536
Total	63,250	80,345	98,097

Capital costs of high-speed rail will evolve as in any major transportation infrastructure project, from early planning and conceptual engineering through preliminary engineering, contract procurement and, ultimately, to final design and construction. As the project scope, alignment, procurement strategies, delivery mode and other key decisions are finalized—and as environmental mitigation and other project components are more accurately specified—capital costs will become more certain and risk factors become more defined, supporting contingency modifications and schedule confidence.

"Finishing a tangible first piece of true high-speed rail with integrated and improved connecting services is the only viable path toward a statewide high-speed rail system for California."

— State Senator Cathleen Galgiani

CURRENT FUNDING

This section provides an overview of the current and projected funding through 2030. As discussed in Chapter 3, we propose to use the funds available through 2030, projected to range from \$20.6 billion to \$23.4 billion, to deliver an initial 171-mile high-

speed rail line between Merced and Bakersfield for passenger service before the end of this decade, environmentally clear the Phase 1 system and, with our regional partners, complete the bookend investments in Northern and Southern California.

STATE FUNDING

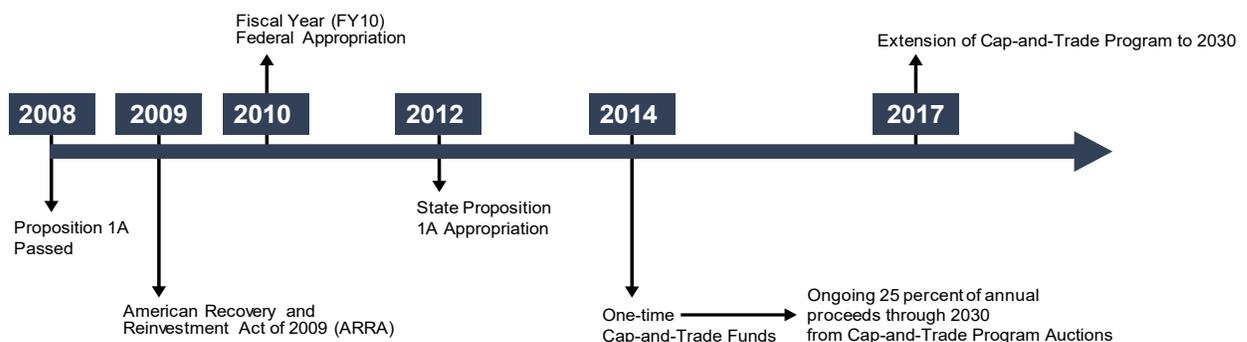
The Authority has secured funds from two State sources: Proposition 1A bond funds and Cap-and-Trade funds.

PROPOSITION 1A

In 2008, Californians voted to build electrified high-speed rail by approving Proposition 1A, which provided \$9.95 billion for high-speed rail planning and construction. Of this, \$9 billion was allocated to the Authority and \$950 million was allocated to local high-speed rail connectivity projects under the oversight of the California Transportation Commission.

In 2012, the Legislature appropriated Proposition 1A funding to advance construction activities in the Central Valley and regional areas: \$2.6 billion was appropriated for the Central Valley and \$1.1 billion was appropriated for bookend projects in Northern and Southern California. Over multiple appropriations, the Legislature has additionally approved about \$600 million for project development, including completing environmental reviews on the entire Phase I system.

Exhibit 4.1: Timeline of Funding for Merced to Bakersfield



In 2017, our Board of Directors adopted three funding plans to access \$3.3 billion in Proposition 1A funds, specifically:

- \$600 million for the Caltrain Peninsula Corridor Electrification Project in Northern California;
- \$77 million for the Rosecrans/Marquardt Grade Separation Project in Southern California; and
- \$2.6 billion for the Central Valley.

These funding plans were approved by the Director of California's Department of Finance and provided the necessary approval to begin selling Proposition 1A bonds to access to the funds previously appropriated in SB 1029.

The Central Valley Segment Funding Plan estimated the cost of construction, including Track and Systems, stations and a heavy maintenance facility scaled to support initial operations. With its approval, the Authority was provided access to \$2.6 billion in Proposition 1A construction funds for the 119-mile segment in the Central Valley that is currently under construction. As of December 31, 2019, the Authority has expended \$2.2 billion of the authorized \$2.6 billion and has put those dollars directly to work in the Central Valley.

Staff expects to bring to the Board a funding plan for \$423 million for the Link Union Station (Link US) Project. This would complete the allocation of all bookend funding to specified construction projects in Southern California and the San Francisco Bay Area.

This Draft 2020 Business Plan recommends the \$4.2 billion in remaining available bond funds be directed to expand the 119-mile Central Valley Segment north and south to create an operating segment of 171 miles between Merced and

Bakersfield, completing all Phase 1 environmental work from San Francisco to Los Angeles/Anaheim and completing all bookend project commitments using Proposition 1A funds.

CAP-AND-TRADE

To reduce greenhouse gas (GHG) emissions in California, the Legislature authorized the development of a trading system of carbon-emissions allowances, also known as the Cap-and-Trade Program. The California Air Resources Board implements the program and oversees the quarterly auctions.

In 2014, the Authority received two, one-time allocations of Cap-and-Trade funding totaling \$650 million. In addition, the Legislature continuously appropriated 25 percent of annual Cap-and-Trade funds for high-speed rail going forward.

In July 2017, the Legislature approved AB 398, which was then signed into law by Governor Brown. This legislation implemented several measures to stabilize the Cap-and-Trade Program, including extending the sunset date through December 31, 2030; this was an important step by the Legislature toward securing a long-term stable source of funding for this project and for regional transit and rail projects statewide. Subsequent to the passage of AB 398, the auctions began yielding more consistent results, providing a more stable funding stream.

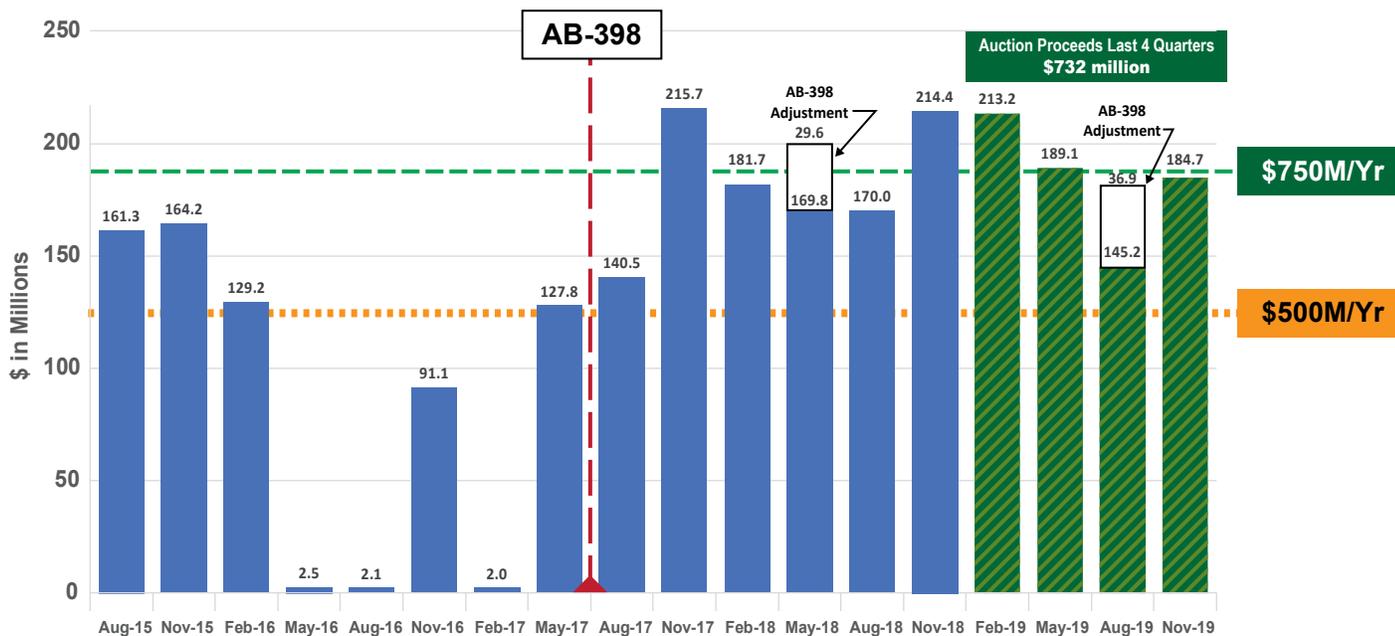
As of December 2019, the Authority has received \$3.2 billion in Cap-and-Trade funds, which includes the initial \$650 million appropriation and quarterly funds since August 2015.

Looking forward, because of the variability of Cap-and-Trade auctions, we have established a range of future Cap-and-Trade receipts for purposes of capital planning. The low range assumes that the

Authority will receive \$500 million per year and the high-range assumes \$750 million per year. As shown on **Exhibit 4.2**, since the passage of AB 398 in July 2017, the Cap-and-Trade receipts for the high-speed rail program have been higher and

less volatile than they were in the past. The last four quarterly auctions have yielded \$732 million in proceeds for high-speed rail, a clear indicator that the Cap-and-Trade program has stabilized.

Exhibit 4.2: Quarterly Cap-and-Trade Auction Proceeds for High-Speed Rail (\$ in Millions)



FEDERAL FUNDING

The Authority has received approximately \$3.5 billion in federal funding commitments to complete environmental review for the Phase 1 system and to construct the 119-mile Central Valley Segment between Madera and Poplar Avenue. Of this:

- \$2.5 billion was from the federal American Recovery and Reinvestment Act of 2009 (ARRA) and;
- \$929 million was appropriated by Congress from Fiscal Year 2010 (FY10) Transportation, Housing and Urban Development funds.

These funds were awarded to us by the Federal Railroad Administration (FRA) through federal grants. This federal partnership was instrumental in enabling us to advance the program into construction.

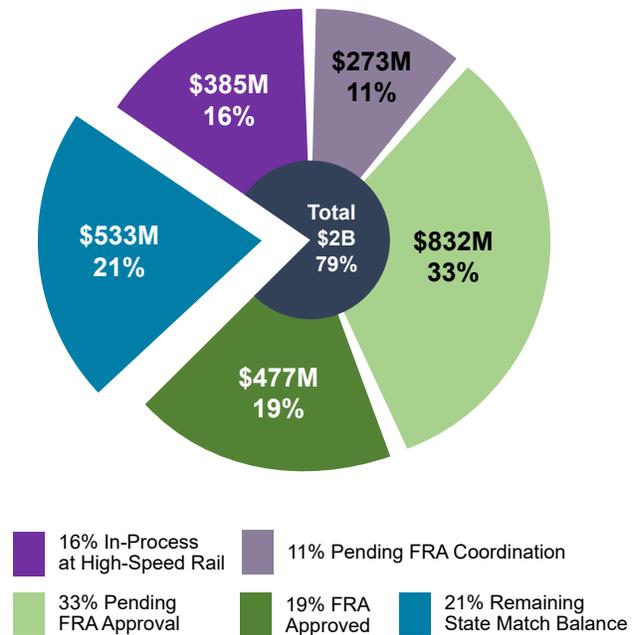
AMERICAN RECOVERY AND REINVESTMENT ACT (ARRA) GRANT

The \$2.5 billion in ARRA funding was fully expended before the statutory deadline and in compliance with the FRA grant requirement. As approved by FRA, a tapered match provision was agreed to which allowed the expenditure of federal funds first, to be followed by the expenditure of state matching funds. This provision was approved due to the short ARRA expenditure deadline. We worked cooperatively with the FRA to ensure that these funds were expended appropriately by September 2017.

As shown in **Exhibit 4.3**, we have currently matched 79 percent of the state funds necessary to meet its ARRA match obligation. To date, the Authority has submitted to FRA approximately 52 percent, \$1.3 billion for approval. The FRA has only processed \$477 million, approximately 19 percent,

as of February 2019 when they disengaged on work related to the project. Another \$658 million is currently under internal review, for a total of nearly \$2.0 billion. We will continue to provide FRA with regular reporting on our match progress pending their reengagement.

Exhibit 4.3: ARRA State-Match Status Update



STATUS OF FEDERAL FY10 GRANT

Per the terms of the federal grant agreement, the FY10 funds, along with \$360 million of state matching funds, are scheduled to be the last funding required to complete the federal grant scope of work. We anticipate accessing FY10 funds as soon as May 2022.

We have worked with the FRA collaboratively over the last 10 years to execute the requirements of the grant agreements. We continue to provide the deliverables and reports stipulated in these agreements. However, on February 19, 2019, the FRA Administrator notified the Authority of the FRA's intent to rescind the \$929 million in federal FY10 grant funds.

On March 4, 2019, the Authority responded and contested the FRA's determination that the project has failed to make steady progress. The response informed the FRA Administrator that withdrawing these funds would be unwarranted, unprecedented and harmful, and requested that the FRA re-engage in the high-speed rail program and restore our functional relationship in delivering the program. The Authority emphasized that it is committed to building the high-speed rail project in full compliance with the federal grant requirements and that the Authority is making progress, including meeting its commitments under its federal grant agreements.

On May 16, 2019, FRA sent a final decision, terminating the FY 10 Grant Agreement and stating that it would de-obligate the \$929 million in funding obligated by the FY 10 Grant Agreement.

On May 21, 2019, the State and the Authority filed a lawsuit against USDOT and FRA in the Federal District Court, Northern District (San Francisco)

asking the Court to enter a judgment in favor of CHSRA to set aside the FRA termination notice.

On May 22, 2019, the Authority and the U.S. DOT stipulated that no portion of the \$929 million in FY 10 Grant Agreement funds that were de-obligated by the federal government would be re-obligated except through a new Notice of Funding Opportunity (NOFO). We agreed not to file a temporary restraining order preventing the re-obligation of the FY 10 Agreement funds until the federal government issued a new NOFO. The parties will participate in court ordered mediation beginning in March 2020.

We are confident in our position that the FRA was in violation of federal law, acted outside of the FRA's policies, procedures and ordinary practice, and was politically motivated in terminating the grant; and that the Authority will receive the \$929 million of FY10 grant monies. At the same time, we recognize that litigation is unpredictable, and for that reason, these funds are at risk. If the FY10 funds are ultimately not available to the program, we would work with the California Department of Finance and the Administration on possible mitigations. A discussion of this potential risk and how we will manage or mitigate it is in Chapter 5.



Rendering: Cedar Viaduct

SUMMARY OF PROJECTED AND EXPENDED FUNDING TO DATE

Table 4.4 summarizes the total forecasted funding for the project through 2030, how much has been expended through November 2019, and the total remaining funds available. Consistent with our assumptions, the table shows a range for future Cap-and-Trade funds.

It also shows the remaining Proposition 1A dollars available to the program. The Authority's ability to use the remaining Proposition 1A funds will require an appropriation by the Legislature and completion of the statutorily required funding plan (Section 2704.08 (d), California Streets and Highways Code). The Authority anticipates requesting a Proposition 1A construction appropriation as part of the 2021 Budget Act.

TABLE 4.4: Summary of Total Funding Available and Total Funds Expended as of 12/31/19 (\$ in Billions)

Funding Source	Total Funding A	Total Expended* B	Total Remaining C = A - B
Federal Funds			
ARRA Construction	2.1	2.1	0.0
ARRA Planning	0.5	0.5	0.0
FY10	0.9	0.0	0.9
State Funds			
Proposition 1A Project Development	0.6	0.5	0.1
Proposition 1A Central Valley Segment Construction	2.6	2.2	0.4
Proposition 1A Bookends	1.1	0.1	1.0
Proposition 1A for future Construction Appropriation	4.2	0.0	4.2
Cap-and-Trade Received through November 2019	3.2	0.7	2.4
Subtotal	15.1	6.2	9.0
Future Cap-and-Trade**	5.5 to 8.3	0.0	5.5 to 8.3
Total	20.6 to 23.4	6.2	14.5 to 17.2

(numbers might not total due to rounding)

*Excludes Administration and other State operations expenditures

**Future Cap-and-Trade funding assumes a low of \$500 million to a high of \$750 million per year from 2020 to 2030 (11 years).

Exhibit 4.4: 2020 Funding Status for Phase 1

P San Francisco to San Jose

43 miles
Capital Cost: \$2.6 billion
EIR/EIS Complete: 08/2021
 Contribution to Caltrain Electrification (Allocated) - \$714 million

U San Jose to Carlucci Road

88 miles
Capital Costs: \$14.2 billion
EIR/EIS Complete: 05/2021

Central Valley Construction

F Madera to Merced

33 miles
Capital Cost: \$2.5 billion
EIR/EIS: Complete

F Madera to Poplar Avenue*

119 miles
Capital Cost: \$12.4 billion
Completion Date: 06/2021
EIR/EIS: Complete

F Poplar Avenue to Bakersfield

19 miles
Construction Cost: \$1.5 billion
EIR/EIS: Complete

P Central Valley Wye Balance

28 miles
Capital Cost: \$2.4 billion
EIR/EIS Complete: 09/2020

*Includes partial funding for Central Valley Wye

Notes:

1. Estimates are from the Draft 2020 Business Plan and exclude vehicle costs and Heavy Maintenance Facility costs not yet allocated to a specific location.
2. Segment miles reflect Preferred Alternatives; total miles could vary pending final environmental decisions.

Legend	
F	Funded
P	Partial
U	Unfunded

High-Speed Rail 2020 Status



U Bakersfield to Palmdale

79 miles
Capital Costs: \$16.3 billion
EIR/EIS Complete: 04/2021

U Palmdale to Burbank

41 miles
Capital Costs: \$17.5 billion
EIR/EIS Complete: 01/2022

U Burbank to Los Angeles

13 miles
Capital Costs: \$1.5 billion
EIR/EIS Complete: 06/2021

U Los Angeles to Anaheim

31 miles
Capital Costs: \$3.6 billion
EIR/EIS Complete: 02/2022

FUNDING OPTIONS TO EXPAND THE SYSTEM

Our objective is to secure additional funding to fill remaining gaps and deliver the Phase 1 system. The primary challenge to closing the gaps and completing these connections is funding. We have been consistent in communicating this to the public and to policy leaders. The Peer Review Group has affirmed this, stating in its letter to the Legislature on the 2018 Business Plan, "the Authority can no longer be expected to deliver a project for which the proposed scope is not matched by adequate and reliable funding."

The remaining Phase 1 project sections will be environmentally cleared within the next 18 to 24 months, at which point designs can be further advanced and pre-construction activities can begin. Funding would position us to advance those activities and then move into construction. **Exhibit 4.4** shows the 2020 status of the Phase 1 system in terms of when each project section will be environmentally cleared, capital cost estimates and funding status (funded, partially funded or unfunded).

Our objective is to seek funding to expand high-speed rail and support seamless connectivity with regional transit and rail providers as outlined in the 2018 State Rail Plan. There are opportunities to achieve both.

The challenges of funding a transportation system of this complexity and magnitude are not new to California. Other large-scale transportation infrastructure projects within the state, as well as those tackled across the country and around the world, have all had to invest incrementally. Delivering the Merced to Bakersfield segment allows us to incrementally achieve the benefits of having a 171-mile operational high-speed rail line

to demonstrate to Californians and the rest of the country.

Importantly, it also provides the Authority with a tangible business case to secure additional funding and build-on this foundational building block, having an environmentally cleared the Phase 1 alignment. When additional funds are secured, the Merced to Bakersfield line can be expanded to the Bay Area/Silicon Valley and Southern California. We will prioritize our funds to deliver a Central Valley line that enhances the state rail network while minimizing the financial operating burden until a longer financially viable line can be implemented.

Going forward, we intend to work with the state, federal government and private sector to identify additional funding and financing opportunities to deliver the full system. This section lays out the current funding available and potential options for future funding that not only support high-speed rail expansion but may also augment funding for regional passenger systems.

STATE FUNDING

This section discusses possible sources of additional state funding that would provide opportunities to expand the funding available for state rail investments; high-speed rail as well as regional rail service providers. As previously noted, approximately 85 percent of the current total available high-speed rail funding is comprised of Proposition 1A and Cap-and-Trade funds. Both the 2016 and 2018 business plans advanced the concept of stabilizing and extending the Cap-and-Trade program from 2031 to 2050 to expand the initial Merced to Bakersfield line to the Bay Area/Silicon Valley and Southern California.

This Draft 2020 Business Plan reiterates how this would provide greater certainty and stability to

our funding and allow us to further advance the project. We also show that this extension would provide new funding for regional transit agencies to invest in modernizing and electrifying their systems and improve connections with high-speed rail.

CAP-AND-TRADE EXTENSION TO 2050

As more wildfires and droughts occur, Californians put addressing climate change as an increasingly higher priority. Extending the Cap-and-Trade program to 2050 would be an important new pillar in meeting the state's policy which targets an 80 percent emissions reduction from 1990 levels by 2050. Equally important, it would help the state achieve other important policy objectives including creating more affordable housing and fostering sustainable communities.

As shown in **Table 4.5**, an extension of the Cap-and-Trade program to 2050 would generate between \$40 billion to \$60 billion in additional funding for the state's Greenhouse Gas Reduction Fund and could provide an additional \$10 billion to \$15 billion in future funding for high-speed rail. These projections are based on total state Cap-and-Trade revenues continuing to come in at between \$2 billion to \$3 billion per year and high-speed rail maintaining its current 25-percent continuous annual appropriation.

With a Cap-and-Trade extension, the Authority would likely accelerate access to these funds through financing. As noted in the discussion below, any financing will incur an added cost of debt which will erode the base receipts but the Authority's ability to maintain the construction schedule will significantly reduce the impact of inflation on construction costs.

Other public transportation agencies would benefit from a Cap-and-Trade extension. The Transit and Intercity Rail Capital Program, which is intended for passenger rail capital projects in addition to other projects aimed at increasing the overall level of rail service, efficiency optimization and reliability, could receive an additional \$4 to \$6 billion. Similarly, the Low Carbon Transit Operations Program, which provides both capital and operating assistance for transit agencies to reduce greenhouse gas (GHG) emissions and improve mobility with a priority on serving disadvantaged communities, could receive an additional \$2 to \$3 billion.

Beyond public transportation, the Affordable Housing and Sustainable Communities Program, which funds loans and grants, including support for transit-oriented development projects, such as mixed commercial and residential projects that optimize access to public transport, could receive an additional \$8 to \$12 billion from a Cap-and-Trade extension to 2050.

Table 4.5: Range of Additional Funding Generated by Cap-and-Trade Extension to 2050 (\$ in Billions)

Funding Uses	Allocation Percentage	\$2.0 Billion/Year Scenario	\$3.0 Billion/Year Scenario
High-Speed Rail	25	10	15
Transit and Intercity Rail Capital Program (TIRCP)	10	4	6
Low Carbon Transit Operations Program (LCTOP)	5	2	3
Affordable Housing/ Sustainable Communities Program (AHSC)	20	8	12
Safe and Affordable Drinking Water Program	5	2	3
Discretionary Funding for Other Projects	35	14	21
Total	100	40	60

*Table assumes current Cap-and-Trade revenue allocations are maintained from 2031 to 2050.

CAP-AND-TRADE FINANCING

As assumed in the 2016 Business Plan and discussed further in the 2018 Business Plan, the Authority may be able to finance its future Cap-and-Trade revenue to accelerate future funding. However, this is contingent upon enacting the supporting legislation to make the financing investment grade. We identified three critical elements to achieve financing:

- Non-impairment of appropriations to the Authority;
- Extension of the Cap-and-Trade program through 2050; and a
- Minimum guarantee (floor) of Authority Cap-and-Trade annual revenues.

If the Cap-and-Trade program is extended through 2050, we would have the option of advancing funds to deliver the balance of the Silicon Valley to Central Valley Line and invest in Southern California by financing future Cap-and-Trade funds from 2031 to 2050.

In the 2018 Business Plan, we analyzed a base case scenario of \$750 million per year and a sensitivity of \$500 million per year. Two interest rates were used—4 percent and 6 percent—as well as a range of assumptions about how much debt service coverage would need to be applied to annual debt payments. This financing could take a number of forms and might include state revenue or lease revenue bonds, federal loan programs or public-private partnerships.

For the Draft 2020 Business Plan, we have kept the underlying financing assumptions the same, maintaining the Cap-and-Trade proceeds, interest rates and debt-service coverage ratio requirements used in the 2018 Business Plan. We have adjusted the drawdown years to 2024 to 2026 and repayment years to 2031 to 2050 to reflect the updated capital cost schedule and the resulting funding needs.

Exhibit 4.5: Capital Raised from Potential Cap-and-Trade Financing Scenarios*

C&T Drawdown Years 2024-2026		C&T Proceeds		C&T Repayment Years: 2031-2050	Debt-Service Coverage Ratio (DSCR)
		\$750M	\$500M		
Interest Rate	4%	\$8.2B	\$5.4B	1.0x	
	6%	\$4.1B	\$2.7B	1.5x	

*In the High Scenarios, a Debt Service Coverage Ratio (DSCR) of 1.0x assumes that the Authority has a priority lien on all periodic C&T receipts. This results in an annual debt service equal to annual C&T proceeds of \$750M. In the Low Scenarios, a Debt Service Coverage Ratio (DSCR) of 1.5x assumes that \$333M per year of the annual C&T proceeds of \$500M must be reserved to service the debt, while the remaining \$167M can be allocated towards capital expenditures to complete the system.

As shown in [Exhibit 4.5](#), the range of potential capital that can be raised from Cap-and-Trade financing is \$2.7 billion to \$8.2 billion.

This is lower than the 2018 Business Plan estimated proceeds because the debt service term has been reduced by seven years (debt service begins in 2031 in the Draft 2020 Business Plan, versus in 2024

in the 2018 Business Plan), allowing for more funds to be used as pay-go. As shown in [Table 4.6](#), the range of total Cap-and-Trade pay-go through 2030 increases from \$3.0 billion to \$3.2 billion in the 2018 Business Plan to \$5.5 billion to \$8.3 billion in the Draft 2020 Business Plan, resulting in higher total Cap-and-Trade receipts.

Table 4.6. Total Projected Cap-and-Trade Proceeds Including Financing through 2050

Cap-and-Trade Funds	2018 High	2018 Low	2020 High	2020 Low
Cap-and-Trade Received through 2019	3.2	3.2	3.2	3.2
Cap-and-Trade Pay-Go through 2030	3.0	3.2	8.3	5.5
Cap-and-Trade Financing	11.1	3.9	8.2	2.7
Total	17.3	10.3	19.7	11.4

OTHER STATE FUNDING OPTIONS

The State has long recognized that rail must be fast, reliable, and connected, to produce the quality transportation system that is needed to achieve the state's mobility and environmental goals. To that end, the State has a long history of supporting rail that goes back to the initiation of State-supported Amtrak service in the 1970s.

The State has recognized shared passenger rail corridors that will host both high-speed rail and commuter rail. These corridors on which high-speed rail will also operate have access to other funding opportunities to bring early benefits to these shared corridors. These include:

- **Cap-and-Trade Funding:** As mentioned on prior pages, a Cap-and-Trade Extension to 2050 would provide additional funding for rail and transit in the likely range of \$6 billion to \$9 billion. Portions of this funding could be available to Caltrans and Metrolink for shared corridor investments.
- **Senate Bill 1 Funding:** The Road Repair and Accountability Act of 2017 invests \$54 billion over the next decade to fix roads, freeways, bridges and transit across California. Of this, about \$1 billion per year is provided for public transit and passenger rail. Portions of that funding is already benefiting Caltrain and Metrolink in the shared corridors. In fact, in April 2020, the Secretary of the California State Transportation Agency will award Transit and Intercity Rail Capital Program (TIRCP) grants to transit and rail projects throughout California. Although the high-speed rail program is not a recipient of SB 1 funds and receives no funding from that measure, SB 1 funding is permanent and regional commuter rail operators may apply for funding to benefit shared corridor projects.

FEDERAL FUNDING

The federal government built the nation's Interstate Highway System through grants to the states that covered most of the costs of building that system. The impact of this investment on the nation's economy is immeasurable. Historically, the federal government has also provided grants to cities and regions building regional mass transit systems averaging 50 percent and higher to partners in the cost of building regional passenger rail systems, such as Bay Area Rapid Transit (BART), where the initial system investments were made with local and state funds and subsequent extensions have been supported by federal dollars. It is hard to imagine the Los Angeles Basin and San Francisco Bay Area without these essential commuter systems moving people within these regions.

Of the \$20.6 to \$23.4 billion in total funds projected to be available for this project, the State of California is providing all but \$3.5 billion. Specifically, to date, the State has made the largest investment in the system with its contributions, through 2030, projected to be over \$17 billion. Historically, transportation-infrastructure projects

of this magnitude have relied on the federal government as a funding partner, with grants of up to 50 percent or higher of total project costs provided through long-term funding agreements. Because of California's importance to the national economy, it is reasonable and appropriate for the federal government to be a full partner with the state.

"Investing in high-speed rail is a commitment to cleaner, more sustainable transportation. My legislation provides the resources needed to make these projects successful. California is leading the way with over 3,000 workers doing 119 miles of construction on 30 sites, and I am proud to introduce legislation to help get the project completed."

— Congressman Jim Costa, (CA-16)



Photo: Caltrain electrification

To date, the federal government has only committed around 15 percent of the total estimated funding for the initial Merced to Bakersfield line. Given the magnitude of the state's commitment for the project, the Authority is well-

positioned to compete for future federal funds that are authorized for transportation infrastructure projects. Those funds will target closing the gaps between the Central Valley and the Silicon Valley and into the Los Angeles Basin.

A New Federal Policy Framework:

In January 2020, members of Congress led by Speaker Nancy Pelosi, put forward a transportation policy framework to invest \$760 billion over five years in America's transit, water and broadband infrastructure. The framework recognizes that while the country's passenger rail services have continued to see increasing demand, they have also traditionally suffered from chronic underinvestment. As such, this plan proposes \$55 billion in transformative rail investments, focusing in part on establishing new higher-speed passenger rail corridors.

In addition to this larger infrastructure package, Congressman Jim Costa has introduced H.R. 5805, known as the High Speed Rail Corridor Development Act of 2020 which would both reauthorize the federal High-Speed Rail Corridor Development Program as well as allow the Secretary of the Department of Transportation to create grants for high-speed rail corridor projects. The legislation authorizes \$32 billion for capital projects in federally designated high-speed rail corridors. For more information see: <https://www.congress.gov/bill/116th-congress/house-bill/5805/cosponsors>

As a complement to proposals for new capital projects, Congressman Mark DeSaulnier has introduced H.R. 5641, the Incentivizing Value Capture for Greener Transportation Act, which would provide grants to develop value capture mechanisms and fund research into value capture instruments. This is necessary assistance to agencies and local jurisdictions seeking to expand the funding options available for transit-oriented projects that deliver riders.

These types of efforts represent new federal funding opportunities and bring national transportation priorities into closer alignment with California's forward-looking transportation objectives.

PRIVATE INVESTMENT

A fundamental premise of this program is that we are creating a commercially viable high-speed rail system that will generate significant revenues and support private investment. Over time, the value of the system as a commercial enterprise will be significant for the State, creating the opportunity for private investment to support system expansion. However, this will likely come after the first commercially viable operable segment—the Silicon Valley to Central Valley Line—demonstrates system viability and maturity.

Consistent with previous business plans, we have analyzed the value of future net cash flows generated by the system. These cash flows run from the start of operations to an end date of 2060. The cash flows are discounted at a range of values to illustrate the potential weighted average cost of capital that private investors may apply. Consistent with previous plans, we have discounted the net operating cash flow after capital replacement of both the Silicon Valley to Central Valley Line and Phase 1 System operations at three illustrative discount rates: 8 percent, 11 percent and 14 percent.

Table 4.7: Monetization – Discounted Cash Flows for Medium Case Forecasts (\$ in Billions)

Phase	8% Discount Rate	11% Discount Rate	14% Discount Rate
Silicon Valley to Central Valley Line	13.2	9.8	7.7
Increment to Complete Phase 1	13.1	9.6	7.4
Cash Flows from Completing Phase 1	26.3	19.5	15.1

Table 4.8: Monetization – Discounted Cash Flows for Low Case Forecasts (\$ in Billions)

Phase	8% Discount Rate	11% Discount Rate	14% Discount Rate
Silicon Valley to Central Valley Line	9.4	7.0	5.5
Increment to Complete Phase 1	9.3	6.9	5.3
Cash Flows from Completing Phase 1	18.7	13.9	10.8

The values above would be captured (monetized) by financing and private sector investment secured by the system's future net operating cash flows. The amount of additional capital to be raised would be determined based on the private sector's valuation of the future cash flows from the incremental phases of the system. The financing transactions for each phase of system expansion could be structured as a combination of private debt financing, federally subsidized loans or other financing tools and private equity.

The discount rate applied by the private sector in valuing future net operating cash flow is based, in large part, on the level of risk transferred to a private sector partner. For example, it is more likely that the private sector would apply a higher

discount rate to any net revenue from a section just placed into service. Conversely, a lower discount rate (and therefore higher valuation) would be used for proven cash flows from existing operational sections.

Once the initial Silicon Valley to Central Valley Line is built out and ridership and revenue is demonstrated, positive cash flows are projected based on the revenue, operations and maintenance and lifecycle forecasts and estimates. These forecasts and estimates are discussed further in this chapter and are shown in Chapter 6.

To illustrate this, if the Silicon Valley to Central Valley Line were fully operational by late 2031, we estimate \$9.8 billion could be available in 2034 after farebox revenue and net operating cash flows have been demonstrated. Although we have provided ranges for both ridership forecasts and discount rates, this estimate is based on the mid-point discount rate of 11 percent applied to the cash flows from the medium revenue and cost forecasts.

Beyond that, after completion of the Phase 1 System and its first operating concession period, the State will have a fully developed and operable asset that it can continue to monetize over successive 20- to 30-year periods to generate funds for reinvestment, expansion (e.g., for Phase 2 extensions) or other purposes.

Further value is also likely to be generated as the high-speed rail system connects with statewide planned expansions and investments to improve transportation networks, which will increase network integration, enhance the user experience and generate higher ridership and corresponding fare revenues. Additionally, planned connectivity to intra-state transportation networks, such as the Virgin Trains USA connection between California and Las Vegas, will further enhance the value of the system.

FORMS OF PRIVATE FINANCING

Several types of private financing could be available to the high-speed rail program:

- **Vendor financing:** This could provide financing to specific pieces of equipment, such as rolling stock or systems technologies;
- **Public-private partnerships:** These could come in many forms and could include availability payments or revenue concessions. They could be used for specific sections, such as tunnels;
- **Concession monetization:** This is the securitization of the revenues arising from the operation of the system, which could also provide a source of financing; and
- **Sovereign Wealth Funds:** These funds could wish to finance the system, and they have historically been involved at similar projects while offering lower than market rates. These funds are often tied to the purchase of specific equipment, such as rolling stock or systems technologies, manufactured in that country.

In all cases where private financing is used, the financier or lender will need to establish the creditworthiness of the borrower (the Authority or the State of California). The creditworthiness will, to a large extent, depend on what entity is standing behind the pledge of the revenues. For example, the full faith and credit of the State of California guaranteeing the revenues will be deemed to have significantly more credit worthiness than a reliance upon the revenues generated by the system on a standalone basis.



Photo: Pre-construction geotechnical soil evaluation

The Virgin Trains USA project, described in Chapter 3, will bring approximately \$4.8 billion in private funds to high-speed rail linking San Bernardino County, California to Las Vegas, Nevada. This private funding is facilitated by state and federal tax credits and financing assistance.

We believe that there is potential for significant synergy in collaborating with Virgin Trains USA to develop an integrated high-speed rail system that can serve California and beyond. Although the systems will be developed independently, their planned connection at Palmdale would significantly increase the combined value of both, from a ridership and financial perspective. Moreover, the extension of the Virgin Train USA project to Palmdale and the completion of our environmental work in Southern California could potentially set the stage for a public-private partnership opportunity extending electrified high-speed rail from Palmdale into the Los Angeles Basin.

LOOKING AHEAD

To date, the State has made a large investment toward funding the system. The current projected funding of \$20.6 billion to \$23.4 billion will be directed toward completing the Central Valley Segment, to meet the federal grant agreement, plus extensions to Merced and Bakersfield. It will fund the Track and Systems and supporting operations facilities to provide service over 171 miles in the Central Valley. Further, it funds our regional bookend projects and environmentally clears the Phase 1 system making them ready for pre-construction activities.

According to conventional wisdom, the State's contribution should position California to be competitive in its pursuit of future federal funds, given the past and current federal emphasis on project sponsors bringing a significant funding match. However, until additional funding becomes available, we must continue to deliver high-speed rail on a pay-as-you-go funding approach, which means that we let contracts as funding is available. Continuing this approach indefinitely will not support the delivery of high-speed rail to California in a meaningful timeframe. Going forward, we will work with the Legislature, our federal partner and the private sector to secure the additional funding and financing to deliver the full system and to position the project to attract private investment.



Photo: September 2019 San Joaquin River Viaduct construction progress on arches.

IDENTIFYING RISKS AND MITIGATION STRATEGIES

Risks are common to all transportation projects and their scope, time and cost impacts vary depending upon the stage of development and the significance of the impact. On large mega-projects, these impacts can be amplified based upon the size and complexity of the program. For the multi-billion-dollar California High-Speed Rail Program, with 119 miles of construction underway and environmentally clearing an approximately 500-mile Phase 1 system, the risks are wide-ranging, as with many other mega-projects.

The risks that we manage daily include risks associated with our current funded, baseline mission; those that affect how we move forward with our remaining funds; and finally, those that could affect the future unfunded program. There are issues that are systemic to all three of these areas, such as financial and legal risks. And others, that are unique such as, as a relatively new agency the ongoing organizational capacity evolution with each new agency milestone—from planning to construction and now initiation of operations planning and construction.

Over the last two years, the disengagement of the federal government in its grant oversight and support role has presented another unique legal and implementation challenge. Although not common, other agencies have experienced federal sanctions and corrective actions. However, before taking any action, federal agencies usually work together with grantees to address issues and concerns. At no time has a grant been active without federal engagement. The Authority currently is proceeding by meeting its grant

CHAPTER 5

responsibilities under unprecedented action by a federal grant agency that no other agency has ever experienced.

Under these overarching program risks, Authority staff manage the day-to-day, individual project segment delivery risks, which includes managing issues associated with completing preliminary designs and environmental reviews and permitting along the Phase 1 system. Additional risks related to construction have been discussed over the last three business plans, and many of these risks remain. With this Draft 2020 Business Plan, we begin to outline risks associated with planning and construction for operations.

■ FUNDING RISKS

The availability of sufficient funds presents one of the largest challenges to the delivery of the high-speed rail program. Access to an ongoing, stable funding stream affects our ability to complete the Silicon Valley to Central Valley Line and, ultimately, the remaining San Francisco to Los Angeles/

Anaheim system. This fact will continue to affect the cost of the program as inflationary escalation is periodically added to remaining segment costs until funding has been identified for construction.

Although funding to complete the Phase 1 system has yet to be identified, there are sufficient funds to complete an initial operable segment in the Central Valley, the bookend investments in Northern and Southern California and completion of all environmental documents for Phase 1. The summary below presents the risks associated with current funding resources. It is important to note, that these resources only support roughly a third of the Phase 1 program financial requirements.

STATE FUNDING RISKS

Currently the State has two major funding sources for the high-speed rail program. The first primary source, and largest, is Proposition 1A, which was approved by the voters in 2008 and authorized by the Legislature in 2012. The second primary source is a one-time and ongoing 25 percent appropriation of Cap-and-Trade proceeds through 2030. For a more detailed description of funding, see Chapter 4.

PROPOSITION 1A

The Legislature has not yet appropriated the remaining \$4.2 billion in Proposition 1A funds. A funding plan still needs to be completed to access this funding. We will need to work closely with the Administration, the California Department of Finance (DOF) and the Legislature on the appropriation to assure that the remaining Proposition 1A funds are available to maintain the current project schedule. Funding delays could affect project cash flows, which would affect the project's delivery schedule.

We work in close coordination with the DOF and the State Treasurer's Office to facilitate Proposition 1A bond sales to meet project cash flow needs. Staff maintain detailed critical-path timelines that describe the requirements to secure approval for accessing the remaining Proposition 1A funds.

CAP-AND-TRADE

The Cap-and-Trade Program provides an initial, long-term source of funding to the high-speed rail program through 2030. The primary risk to Cap-and-Trade funding is that receipts could be lower than forecast. Because Cap-and-Trade is an auction-based revenue source that is contingent upon market factors, it is difficult to predict with certainty the results of future auctions. This creates challenges when planning for projects that are dependent on Cap-and-Trade revenues.

Also, future revenues may be volatile due to the inherent nature of the program. The Cap-and-Trade Program's overarching goal is to reduce greenhouse gas (GHG) emissions. Therefore, the number of allowances and prices may change as industries make longer term investments to meet reduction targets—this could result in lower fund revenues. Conversely, the reduction in the number of allowances sold over time could increase the price of remaining allowances. Independent forecasts indicate that the decrease in allowance supply and increased allowance price could result in higher fund revenues.

A fixed annual receipt of Cap-and-Trade proceeds guaranteed by the State of California would provide greater certainty and allow us more flexibility in applying those funds to long-term contracts. It would allow us to more accurately plan for future expenditures. Current mitigations include cash management and planning, but this

may not be sufficient for large procurements that depend on multiyear Cap-and-Trade revenues.

We assess each Cap-and-Trade auction result and actively manage commitments of Cap-and-Trade funds. For planning purposes, and as documented in the 2018 Business Plan, we assume average receipts in a range of \$500 million to \$750 million annually moving forward. This assumption is supported by the California Legislative Analyst's Office (LAO), which published the Cap-and-Trade Extension: Issues for Legislative Oversight report in December 2017. The last four quarterly auctions have averaged \$732 million per year.

FEDERAL FUNDING RISKS

We have two funding agreements with the Federal Railroad Administration (FRA), totaling approximately \$3.5 billion. These funds have been at risk since the FRA's May 2019 letter terminating the FY10 grant agreement and, arguably, before that time when the FRA disengaged from any oversight or communication with us. This has affected both grant agreements—ARRA and FY10—and is an ongoing funding and litigation risk.

AMERICAN RECOVERY AND REINVESTMENT ACT GRANT (ARRA)

In cooperation with the FRA, we met the ARRA federal grant expenditure deadline of September 2017. Currently, we are fulfilling its state match obligation under the agreement's tapered match provision, which allowed all ARRA federal funds to be expended first followed by state match requirements.

As of December 2019, we have recorded nearly \$2.0 billion in state match, roughly 79 percent of the total ARRA match required. However, the FRA

stopped reviewing or approving our invoices as of February 2019. At that time the FRA had only accepted \$477 million of the Authority's match expenditures.

The federal government indicated in its February 2019 letter that it may consider additional action to reclaim already expended ARRA federal funds. This action would likely result in additional litigation and could have other financial impacts to the State of California.

FISCAL YEAR 10 GRANT (FY10)

The agreements also require us to pay any increased costs to complete the federal project scope of work prior to gaining access to federal FY10 funds. FY10 federal funds and the state's match are to be the last dollars spent on completing the grant funded projects. The current funding plan to the FRA projects access to these funds in May 2022.

The FRA de-obligated the \$929 million provided in the FY10 grant agreement in May 2019. The State of California filed a legal suit to stop this action. As a result, the future of federal FY10 funds remains uncertain. It is possible that we will lose access to the \$929 million in FY10 funds, which would reduce current funding for the program. Delay in access to, or elimination of, this funding resource will at a minimum affect the program's cash flow and could affect our ability to expand the initial system. If that occurs, we would work with the DOF and the Administration on funding alternatives. We estimate that Cap-and-Trade funding would have to generate a minimum of \$565 million per year from now until 2030 to cover just the loss of the \$929 million. This would be necessary to cover the costs of funded program objectives, as described in this report.

We have undertaken a comprehensive re-evaluation of the costs and schedule to complete the federal grants' scope as part of the May 2019 approved baseline cost estimate. However, our 2019 Program Baseline includes sufficient State funding to complete the scope of work for both grants.

LITIGATION RISKS

A program of this nature will experience many different legal risks. These include potential litigation and adjudicatory administrative processes related to project funding, environmental clearances, property acquisition and contract disputes. Previous litigation already affected the Central Valley Segment construction costs and schedules.

PROPOSITION 1A LEGAL CHALLENGES

John Tos, et al. v. California High-Speed Rail Authority – Sacramento Superior Court, filed December, 13, 2016

The lawsuit is related to two Proposition 1A bond funding plan actions approved by the Board of Directors for the San Francisco to San José Corridor electrification project and the Central Valley construction segment. These funding plans allow Proposition 1A bonds to be sold and the funds used for these capital projects. The lawsuit alleges that the Legislature violated the California Constitution when it passed AB 1889 (2016) because AB 1889 materially modified Proposition 1A without voter approval.

AB 1889 legislation states that a corridor or usable segment is "suitable and ready for high-speed trains to operate immediately on after additional planned investments are made on the usable

segment and passenger train service providers will benefit from the project in the near-term." Plaintiffs asked the court to declare AB 1889 unconstitutional. Plaintiffs also alleged that the two funding plans approved by the Authority, and the associated independent consultant reports, failed to meet a number of the requirements of Proposition 1A.

In November 2018, the Superior Court ruled in the Authority's favor, finding that AB 1889 was constitutional. Plaintiffs conceded that if AB 1889 is valid, the funding plans are also valid. All parties stipulated to enter a final judgment in the Authority's favor. The case was appealed by Tos, et al, in May 2019. The appellate case has been briefed. The Authority is being represented by the Attorney General's office in the Appeal.

FEDERAL RAILROAD ADMINISTRATION (FRA) LITIGATION

State of California, California High Speed Rail Authority v. U.S. DOT, Elaine Chao, the Federal Railroad Administration, Ronald Batory – U.S. District Court for the Northern District of California, filed May 21, 2019

The State of California and the Authority filed a lawsuit against the U.S. Department of Transportation (U.S. DOT) and the FRA in the Federal District Court, Northern District (San Francisco), asking the court to enter a judgment in favor of the Authority to set aside an FRA decision to terminate the \$929 million FY 10 Grant Agreement entered into between the FRA and the Authority. The complaint seeks declaratory and injunctive relief and a finding by the court that the FRA's action was in violation of federal law, outside of the FRA's policies, procedures and ordinary practice, and politically motivated.

On May 22, 2019, the Authority and the U.S. DOT stipulated that no portion of the \$929 million in FY10 Grant Agreement funds that were de-obligated by the federal government would be re-obligated except through a new Notice of Funding Opportunity (NOFO). The Authority agreed not to file a temporary restraining order preventing the re-obligation of the FY10 Agreement funds until the federal government issued a new NOFO.

The court has ordered the parties to participate in an Alternative Dispute Resolution process. A settlement conference is scheduled for March 2020.

FUTURE LITIGATION

It is likely that similar litigation on other project sections or new litigation may arise in the future. As the program advances, the Authority will work closely with affected stakeholders to address issues before they become formal lawsuits. In addition, the agency will continue its practice of using alternative dispute resolution processes, such as mediation or arbitration, where possible.

STAKEHOLDER SUPPORT RISKS

Public support has remained at a consistent level throughout the duration of the project since Proposition 1A was passed. Most recently, a 2018 Public Policy Institute of California (PPIC) Poll found that many Californians (53 percent) supported the project. It is imperative that we continue to work diligently with the communities and stakeholders along the alignment and statewide to ensure accurate information is provided. Maintaining strong public support at all levels through education and outreach is vital to the program's success.

If we do not clearly articulate both the program's impacts, costs and benefits support could weaken. As well, if we agree to mitigations without first determining their overall program cost implications, there is a risk that public support will erode which could impact the program's schedule and cost.

Communication with external entities is a responsibility managed at all levels within the organization, both at a statewide and regional level. At the state level, ongoing communication with legislators and state agencies ensures that current and factual information is shared. Similarly, at the federal level, our staff, as well as staff at the California State Transportation Agency (CalSTA), maintain an ongoing line of communication with members of Congress and their staff and with federal agencies.

At the statewide, regional and project-section levels, outreach activities include, but are not limited to, open houses, community meetings, community and technical working groups, community and stakeholder outreach specific to each project section, digital engagement events, and multi-media efforts, such as video, graphics and animations. The Regional Directors and local section outreach teams act as a point of contact for local and regional stakeholders to address community needs and concerns related to potential project effects in their areas. Regular stakeholder and/or public meetings facilitate communication and build relationships between the high-speed rail program and public participants and ensure that design address community issues and concerns.

ORGANIZATIONAL DEVELOPMENT

Over the last two years we have been addressing organization issues that we and the California State Auditor found on the efficiency and efficacy of the policies and practices employed by the Authority. The State Auditor's report identified three broad areas for improvement: planning, contract management, and monitoring and reporting, and made 17 specific recommendations. The state Audit affirmed concerns we were already in the process of addressing and recommended actions for improvement. Those recommendations augmented the work we have now completed.

In addition, the Peer Review Group has noted organizational capacity concerns related to oversight and management of upcoming operations contracts. When we started construction, we were slow to make the transition from strategic planning to project delivery. We were transparent about these challenges in the 2018 Business Plan and presented our strategies to create a mature organization; one with the necessary delivery capacity and capabilities. We, in consultation with the Early Train Operator (ETO), will continue to evolve the organization to ensure appropriate State management and oversight of these operational contracts and activities.

STATE AUDIT ONE-YEAR UPDATE

In the year since the report was issued, the Authority has worked diligently to implement the recommendations and provide evidence of implementation to the State Auditor. The recommendations focused on improving processes and updating areas of construction planning and oversight, contract management, contract manager oversight; and legislative, sustainability, and small business utilization reporting.

As a result of our focused efforts, the State Auditor has concurred that 16 of the 17 recommendations are either partially or fully complete, and those that the State Auditor has deemed partially implemented are primarily based on awaiting implementation results. For example, documenting instances of disagreement with consultants hired to provide advice will remain partially implemented until there is a future example of disagreement to document. Or establishing formal prerequisites for beginning construction will remain partially implemented until we are closer to executing a construction contract and pre-construction activities are sufficiently advanced. One recommendation related to preparing a contingency plan if the ARRA deadline cannot be met is on hold awaiting re-engagement from the FRA.

"There has been a high level of commitment from them and it's encouraging as we go through this process."

— Mark Reinardy, State Auditor's Office,
Joint Hearing Senate Transportation Committee
and Senate Budget Subcommittee, March 2019

PROGRAM DELIVERY RISKS

The progress that we have made on environmental clearances and efforts to finalize designs to increase the rate of construction in the Central Valley sets the stage to significantly move the project forward over the next two years. We are actively managing the risks related to the remaining \$2 billion in current construction on the 119 miles from Merced to Poplar Avenue. However, the upcoming construction related to developing an operational, electrified test track represent new areas of risk under development. Some key areas of focus are discussed below.

MEETING THE FEDERAL GRANTS DEADLINE

We remain focused on meeting the federal grant schedule of December 31, 2022. This will require completion of construction along the 119-mile Central Valley Segment and all Phase 1 Records Of Decision (RODs). However, there are areas of risk that remain to achieve this goal.

CENTRAL VALLEY CONSTRUCTION

Staff has developed a comprehensive project risk register that identifies various direct cost risk items associated with the design-build work underway. Individual risks are defined and subject-matter experts oversee current progress in these areas. Ongoing risks include potential scope changes due to final third-party designs or additional requirements. Other risks include right-of-way acquisition delays, negotiations with remaining third parties and utility relocations. In addition, there are isolated pieces of construction—such as the SR-46 improvements in Wasco—that we are adopting strategies for timely procurement and completion by the 2022 deadline.

These risks were identified through the Monte Carlo analysis for the adoption of the \$15.6 billion Baseline Budget. For additional information related to this current construction, see the Capital Cost Basis of Estimate Report Technical Supporting Document at https://hsr.ca.gov/docs/about/business_plans/2020_Business_Plan_Capital_Cost_Basis_of_Estimate_Report.pdf.

OPERATIONS INFRASTRUCTURE CONSTRUCTION

The final piece of construction to complete the federal scope of work includes the installation of track and train communications along the 119 miles. In December 2019, we released a Track and Systems request for proposals. To meet the December 2022 deadline, we have proposed how this contractor will be given access to the guideway for construction. The construction phasing is unusual and will require a degree of flexibility and coordination between the design-builder and track-and-system contractors.

As we add additional contractors to these existing areas of work a new level of coordination will be necessary. Challenges moving forward will include the transition and availability of civil infrastructure for operations infrastructure construction. This will involve integrating new contractors along the guideway as portions of guideway are still under construction.

PHASE 1 ENVIRONMENTAL COMPLETION

The environmental process to identify preferred alternative alignments is complete, but additional refinements continue as part of the outreach for and technical analysis related to draft environmental documents. These designs are still at a very preliminary phase of development and subject to completed environmental analysis

(other than between approximately Madera and Bakersfield, where the environmental review process is complete).

Several corridors still have remaining stakeholder issues to be resolved. These include, but are not limited to, addressing concerns through the Angeles National Forest, addressing potentially conflicting local land use planning in certain Bay Area locations, shared corridor designs, addressing sensitive cultural, historical, environmental and ecological areas, other concerns important to local cities and neighborhoods, and specific alignment concerns such as the crossing at Burbank Airport.

Additionally, we are working with a large number of cooperating and responsible federal, state and local agencies to address in the environmental documents their concerns about alignments, potential impacts and mitigation. These include agencies such as the Surface Transportation Board, the U.S. Forest Service, the U.S. Army Corps of Engineers, the U.S. Fish and Wildlife service, as well as the California Department of Fish and Wildlife and the State Water Resources Control Board. These agencies have important roles and expertise in ensuring specific resources are evaluated, considered and protected. Consistent with that role, these agencies provide comments that are, at times, extensive and require time to address.

Although we obtained National Environmental Policy Act (NEPA) Assignment, the FRA still needs to take certain actions necessary to complete the environmental process, including making General Conformity determinations under the Clean Air Act, conducting formal Government-to-Government consultations with federal tribes as needed, making any 4(f) constructive use determinations, and making decisions with national policy implications. A failure by the FRA to timely take such actions

may delay the Authority's ability to meet its environmental responsibilities.

In short, the environmental review process is the main opportunity for the public and government stakeholders to understand and comment upon our location and preliminary design and associated potential construction and operational impacts. We take very seriously our responsibility to collaborate with these stakeholders to find balanced solutions to concerns. Accordingly, the environmental schedules in this 2020 Draft Business Plan predict completion dates well in advance of the federal ARRA deadline to provide a meaningful schedule buffer if needed to allow as much time as possible for potential resolution of stakeholder concerns.

CONTINUING TO BUILD ON LESSONS LEARNED

We have noted in past business plans the ongoing challenges of building the first high-speed rail line in the United States. We continue to refine how we address these challenges. Two areas where we will continue to focus our efforts include those related to engineering of tunnel construction and how we will move forward in future construction.

ENGINEERING

We continue to apply our engineering discipline to address identified risks on current construction. This is part of the significant mitigation approach being used to address remaining Madera to Poplar Avenue construction challenges. This work has eliminated some risks and resulted in new approaches to identified challenges. These are all part of the funded project risks we currently face.

However, there are many unknowns associated with the engineering and environmental challenges with tunnels in mountainous terrains

to close the gaps, which are currently unfunded. Staff are actively working with experts as part of the environmental process in these areas to identify opportunities and challenges and have conducted a preliminary hazard analysis on tunneling, ventilation and geotechnical risks. This will help to refine future costs and risks of this work to connect the Central Valley to Northern and Southern California. Staff will continue to explore these technical issues associated with construction as funds are available.

RIGHT-OF-WAY ACQUISITION AND THIRD-PARTY AGREEMENTS

We have reported previously on the impacts moving to construction early had in these areas. Although these activities are consistent risk areas that all major projects face, our work over the last two years is making us smarter about how we prioritize the work in the future. Some risks to construction remain, but through the rigorous process of overseeing and managing these activities, construction in the Central Valley is progressing.

The total number of parcels now necessary for Central Valley existing construction has increased to approximately 2,000. We have acquired more than 75 percent of the parcels necessary for Central Valley construction. In September 2018, the Legislature approved Senate Bill 1172, which allowed us to directly acquire right of way through purchase and eminent domain. This has streamlined our process of acquisition. Contingency was added to current construction contracts to manage this remaining risk.

Third-party agreements are expected to be complete by the first quarter of 2020. Similar to right-of-way, contingency was added to address these outstanding agreements.

Although it is uncertain if similar conditions will arise with future work, we have now identified the pre-construction activities necessary prior to award of construction contracts in order to mitigate our past experiences. These activities will set the configuration of the alignment, including the identification of right-of-way and third-party agreements, and utility relocations that will be necessary for construction. This may also result in consideration of alternative construction methods.

TRAINSET PROCUREMENT

The next significant contract will be for trainsets. The design and development of these vehicles will require additional interfaces with contractors designing and building the operations infrastructure. The design will require coordination with the Track and Systems contractor on connections to the communications network as well as track and electrical interfaces. In addition, this contractor will also be responsible for the development of train maintenance facilities.

RIDERSHIP/REVENUE RISKS

Ridership revenues need to be projected to be sufficient to cover the operations and maintenance costs of the Program to comply with Proposition 1A requirements. It is envisioned that, at some point, the program's expansion will use system revenues to support access to private capital as the program matures. Inaccurate ridership forecasts could affect the level of private sector investment, increasing the reliance on public funding and damaging stakeholder support.

We work with the Early Train Operator (ETO) to ensure that the travel demand modelling incorporates the latest developments in ridership estimating and assessing travel network forecasts. The ETO brings industry expertise to current ridership and revenue strategies to help us make future decisions on how to maximize ridership and revenue. Updates to the travel model have begun with the work the ETO has completed in the Central Valley and as part of the Side-by-Side Study that it completed at the request of the Authority's Board of Directors. Further work will be conducted to continue to refine the overall program model.

In addition, we also subject the analysis to an independent peer review group. More information about the program model can be found in the Travel Demand Model Documentation Technical Supporting Document. To view this report, visit https://hsr.ca.gov/docs/about/business_plans/2020_Business_Plan_CHSR_Ridership_and_Revenue_Model_BP_Model_Ver3_Model_Doc.pdf.

FUTURE RISKS AND NEW TECHNOLOGY

The Authority has now initiated a more in-depth discussion on future risks related to operation. New information now being developed relates to the design of Track and Systems for ultimate operations.

By way of example, we identified an issue that relates to connections to the power grid for high-speed rail electrification. The cost of these interconnections was previously included in traction power costs and assumed a nominal cost for each interconnection site. Technical feasibility studies by PG&E now indicate that there are capacity variations along the corridor that need to be upgraded for high-speed rail operations. Work is underway with PG&E to define the scope and costs of these improvements to the network including new transmission line construction necessary for a reliable power supply within the PG&E service territory. Similar efforts will be necessary in Southern California, which is served by SoCal Edison and other providers.

The ETO will begin to help expand and assess additional risks moving forward.

OPERATIONS AND MAINTENANCE AND CAPITAL REPLACEMENT RISKS

Differences between actual costs and forecasts could result in limiting resources available to continue system expansion. We will enhance our understanding of these areas through interactions with Network Rail (the operator and maintainer of both the high-speed and conventional rail network infrastructure in the United Kingdom), the ETO and the International Union of Railways to incorporate best practices.

Current assumptions and efforts are also documented in the Operations and Maintenance Cost Model Documentation Technical Supporting Document. To view this report, visit https://hsr.ca.gov/docs/about/business_plans/2020_Business_Plan_Operations_and_Maintenance_Cost_Model.pdf.



Rendering: Elevated high-speed train on the Pacheco Viaduct

FORECASTS AND ESTIMATES

This chapter provides the current forecasts and estimates related to the Silicon Valley to Central Valley and Phase 1 lines. These forecasts and estimates are developed pursuant to the 2020 Draft Business Plan statutory requirements related to alternative financial scenarios. The areas covered in this chapter include:

- Ridership and revenue forecasts (high, medium and low);
- Operations and maintenance (O&M) cost estimates (high, medium and low);
- Life cycle cost estimates (high, medium and low); and
- Cash flow estimate (high, medium and low).

A final breakeven Monte Carlo analysis is this conducted for three scenarios:

- Silicon Valley to Central Valley Line (opening year 2031);
- Phase 1 Line (opening year 2033); and
- Horizon Year of Phase 1 Operations (2040).

These forecasts and estimates are based on assumptions that a Silicon Valley to Central Valley Line will be operational by late 2031 and the Phase 1 System operational by 2033. These dates are driven by the amount of time it would take to build these lines, assuming funding is available when needed.

All dates and numbers presented in this Draft 2020 Business Plan are the best estimates available and are subject to change as the program progresses. Detailed methodologies and assumptions for all

CHAPTER 6

forecasts are included in the supporting technical documents to this Draft 2020 Business Plan.

SERVICE ASSUMPTIONS

Over the last two years, the Early Train Operator (ETO) and the Authority have worked with stakeholders and other rail passenger service providers to refine ridership, revenue and operating plan assumptions for the proposed Silicon Valley to Central Valley Line and subsequent extensions. This has included discussions on mobility, transit connectivity, shared facilities, new sources of revenue and other initiatives aimed at enhancing how the state's rail network connects and operates together.

Interim service between Merced and Bakersfield is expected to build the market and demand for high-speed rail service. It is anticipated this will generate higher beginning ridership results once the line connects to the larger Bay Area population and employment. This Draft 2020 Business Plan also includes a revised service assumption for the Silicon

Valley to Central Valley Line. The 2018 Business Plan assumed a single line from San Francisco’s 4th and King Station to Bakersfield. In 2020, this line is now enhanced by the addition of the Merced to Bakersfield Line. Both the augmented Silicon Valley to Central Valley Line (with Merced) and the Phase 1 services are forecasted to continue to demonstrate significant net revenue performance.

The Silicon Valley to Central Valley scenario assumes a one-seat ride from San Francisco to Bakersfield and from Merced to Bakersfield opening in late 2031. The Phase 1 System service adds a direct service connection between San Francisco and Merced and extends service from the Central Valley to Los Angeles/Anaheim, assumed to open in late 2033.

For a complete summary of the service assumptions used for this Draft 2020 Business Plan, please see the Service Planning Methodology Technical Supporting Document at https://hsr.ca.gov/docs/about/business_plans/2020_Business_Plan_Service_Planning_Methodology.pdf.

DRAFT 2020 BUSINESS PLAN RIDERSHIP AND REVENUE FORECASTS

The ridership and farebox revenue forecasting model has been updated since 2018 to include the latest available input data related to:

- Socioeconomic forecasts;
- Transit network plans;
- Auto travel time;
- Auto operating costs;
- Parking costs; and
- Updated high-speed rail service plans, reflecting updated trip times, station assumptions, service frequency and service patterns.

Initial model runs were based upon the 2018 Business Plan opening years of 2029 and 2033 for the Silicon Valley to Central Valley Line and 2033 and 2040 for Phase 1 System. The Silicon Valley to Central Valley ridership forecast was further refined based on a revised 2031 opening date.

Ridership and farebox revenue forecasts also incorporate a revised ramp-up methodology from the 2018 Business Plan. These revised ramp-up assumptions reflect the initial Merced to Bakersfield operations’ impact on riders’ perception and awareness of future Silicon Valley to Central Valley and Phase 1 services. The assumption in previous business plans was that the Silicon Valley to Central Valley Line would be the first operation of high-speed rail service. Initial operation in the Central Valley will change this dynamic and is projected to lead to quicker ridership growth.

The updated ramp-up factors are shown in **Table 6.0** on page 141.

Table 6.0: Ramp-up Factors (in percent)

Ramp-up Application	Year 1	Year 2	Year 3	Year 4	Year 5
Ridership Silicon Valley to Central Valley Line	50	68	86	97	100
Revenue Silicon Valley to Central Valley Line	49	66	84	96	100
Ridership Phase 1 Increment	68	79	89	97	100
Revenue Phase 1 Increment	63	75	86	96	100

The changes to the service plan result in slightly increased ridership and revenue over the 2018 Business Plan results. This is primarily due to the increased service incorporating the Merced extension. However, the model's decreased population and employment forecasts has tempered these ridership increases to some extent. For more detailed discussion of these impacts, see the Ridership and Revenue Forecasting Technical Supporting Document at https://hsr.ca.gov/docs/about/business_plans/2020_Business_Plan_Ridership_and_Revenue_Forecasting.pdf.

RIDERSHIP AND REVENUE RISK ANALYSIS

The ridership and farebox revenue forecasts continue to use the enhanced risk analysis that addressed the feedback provided by Project Finance Advisory, Ltd. (PFAL), from its review of the 2016 Business Plan forecasts. The Draft 2020 Business Plan risk analysis considers the same risk variables as the 2018 Business Plan but applied to the new ridership analysis for the Draft 2020 Business Plan. The risk analysis was conducted separately for the Silicon Valley to Central Valley Line opening year (2031), the Phase 1 opening year (2033) and Phase 1 horizon year (2040). Similar to the base case estimates, output for the Silicon Valley to Central Valley forecasts were updated to reflect the assumed opening date of 2031.

This risk analysis builds upon the risk analysis conducted in 2018 and continues the use of the following risk variables based on the PFAL external review:

- Reliability of high-speed rail—capturing uncertainty around on-time reliability;
- Travel time in autonomous vehicles—measuring the disutility of time spent in an automobile and considers how travel choices might change with autonomous vehicles;
- Visitor travel—including out-of-state trips from tourism, business and other travel;
- Induced travel—including trips that would not have otherwise been made without the increased connections created by the high-speed rail system; and
- An enhanced penalty applied to long-distance high-speed rail trips that require long access/egress travel time.

For more detailed information on these results, see the Ridership and Revenue Risk Analysis Technical Supporting Document at https://hsr.ca.gov/docs/about/business_plans/2020_Business_Plan_2018_CHSR_Business_Plan_Ridership_and_Revenue_Risk_Analysis.pdf.

SILICON VALLEY TO CENTRAL VALLEY RESULTS

Tables 6.1, 6.1.1, and 6.1.2 provide the ridership and revenue results for the Silicon Valley Central Valley Line. These results reflect one month of Silicon Valley to Central Valley operations in 2031 and one month of Phase 1 operation in 2033. In addition, the future year of expenditure (YOE) assumes an escalation of 3 percent per year from June 2019.

Table 6.1: Silicon Valley to Central Valley High, Medium and Low Ridership by Year (Riders in Millions)

Ridership Level	2031	2032	2033
High Ridership	1.0	12.1	17.9
Medium Ridership	0.7	8.6	12.8
Low Ridership	0.6	7.0	10.3

Table 6.1.1: Silicon Valley to Central Valley High, Medium and Low Farebox Revenue by Year (2019\$ in Millions)

Revenue Level	2031	2032	2033
High Revenue	61	759	1,116
Medium Revenue	42	520	769
Low Revenue	35	437	648

Table 6.1.2: Silicon Valley to Central Valley High, Medium and Low Farebox Revenue by Year (YOE \$ in Millions)

Revenue Level	2031	2032	2033
High Revenue	87	1,115	1,688
Medium Revenue	59	763	1,163
Low Revenue	50	642	980

PHASE 1 RESULTS

Tables 6.2, 6.2.1, and 6.2.2 provide the ridership and revenue results for Phase 1. Ridership and revenue results assume one month of full Phase 1 operation in 2033. Future year of expenditure (YOE) estimates assume an escalation of 3 percent per year from June 2019.

Table 6.2: Phase 1 High, Medium and Low Ridership By Year (Riders in Millions)

Ridership Level	2033	2034	2035	2040	2045	2050	2055	2060
High Ridership	17.9	36.4	41.9	50.0	52.6	55.2	58.1	61.0
Medium Ridership	12.8	27.8	32.0	38.6	40.5	42.6	44.8	47.1
Low Ridership	10.3	21.3	24.5	29.3	30.8	32.3	34.0	35.7

Table 6.2.1: Phase 1 High, Medium and Low Farebox Revenue by Year (2019\$ in Millions)

Revenue Level	2033	2034	2035	2040	2045	2050	2055	2060
High Revenue	1,116	2,319	2,723	3,381	3,466	3,554	3,644	3,736
Medium Revenue	769	1,644	1,932	2,410	2,471	2,533	2,597	2,663
Low Revenue	648	1,388	1,631	2,036	2,087	2,140	2,194	2,249

Table 6.2.2: Phase 1 High, Medium and Low Farebox Revenue by Year (YOE \$ in Millions)

Revenue Level	2033	2034	2035	2040	2045	2050	2055	2060
High Revenue	1,688	3,614	4,369	6,290	7,476	8,885	10,560	12,552
Medium Revenue	1,163	2,562	3,100	4,484	5,329	6,334	7,528	8,947
Low Revenue	980	2,163	2,618	3,787	4,501	5,350	6,359	7,558



Photo: Lazy K vernal pool restoration

GREENHOUSE GAS (GHG) ANALYSIS

The following tables describe the GHG benefits of implementing high-speed rail as part of a building block approach. The information below, summarizes the benefits achieved annually with each service implementation phase beginning with Merced to Bakersfield in 2029, followed by the introduction of service on the Silicon Valley to Central Valley line in 2031 and the full Phase 1 System by 2033.

**Table 6.3: Merced to Bakersfield GHG Reductions by Year
(in Millions Metric Tons of Carbon Dioxide Equivalent)**

Ridership Level	2029	2030
High Ridership	.075	.075
Medium Ridership	.075	.075

**Table 6.3.1: Silicon Valley to Central Valley GHG Reductions by Year
(in Millions Metric Tons of Carbon Dioxide Equivalent)**

Ridership Level	2031	2032
High Ridership	.1	.42
Medium Ridership	.093	.32

Table 6.3.2: Phase 1 GHG Reductions by Year (in Millions Metric Tons of Carbon Dioxide Equivalent)

Ridership Level	2033	2034	2035	2040	2045	2050	2055	2060
High Ridership	.615	1.314	1.504	1.775	1.853	1.943	2.042	2.146
Medium Ridership	.480	1.073	1.229	1.459	1.524	1.598	1.680	1.765

OPERATIONS AND MAINTENANCE COST ESTIMATES

Based upon the ETO's review and experience, adjustments have been made to the Draft 2020 Business Plan Operations and Maintenance (O&M) model assumptions to incorporate the latest available data. The key enhancements to the previous 2018 technical report include:

- Full operation of Silicon Valley to Central Valley and Phase 1 services, eliminating the operational ramp-up based on implementation of Merced to Bakersfield service;
- Maintenance and operations cost approach based on a maintenance response time with service levels assumed in the updated service plan;
- Cost assumptions for track access fees in the shared corridors;
- Updated revenue collection costs, including the costs to operate and maintain fare collection infrastructure; and
- New staffing approaches.

Consistent with the 2018 Business Plan approach, a Monte Carlo simulation was conducted to understand the risks and uncertainties associated with the forecasts. These are then applied to derive a forecast O&M range of costs. The high- and low-cost forecasts presented reflect the results of these Monte Carlo simulations.

Overall, O&M costs have increased when compared to the 2018 Business Plan. First, the Silicon Valley to Central Valley Line assumes a new service plan that incorporates the Merced extension of the initial Merced to Bakersfield service. In addition, the ETO's review of previous assumptions and the application of their global experience has also updated some baseline costs. For more information on these changes see, the Operations and Maintenance Cost Model Documentation Technical Supporting Document at:

https://hsr.ca.gov/docs/about/business_plans/2020_Business_Plan_Operations_and_Maintenance_Cost_Model.pdf.

SILICON VALLEY TO CENTRAL VALLEY RESULTS

Table 6.4 and 6.4.1 summarize the results of the Silicon Valley to Central Valley analysis. Consistent with the ridership and revenue, these results assume one month of Silicon Valley to Central Valley operations in 2031 and one month of Phase 1 operations in 2033. Year of expenditure costs assume an escalation of 3 percent per year from June 2019.

Table 6.4: Silicon Valley to Central Valley High, Medium and Low O&M Costs by Year (2019 \$ in Millions)

O&M Levels	2031	2032	2033
High Operations and Maintenance Cost	38	457	557
Medium Operations and Maintenance Cost	35	418	509
Low Operations and Maintenance Cost	34	402	491

Table 6.4.1: Silicon Valley to Central Valley High, Medium and Low O&M Costs by Year (YOE \$ in Millions)

O&M Levels	2031	2032	2033
High Operations and Maintenance Cost	54	671	842
Medium Operations and Maintenance Cost	50	614	770
Low Operations and Maintenance Cost	48	591	742

PHASE 1 RESULTS

Table 6.5 and 6.5.1 summarize the analysis for Phase 1 O&M costs. These results assume one month of Phase 1 operations in 2033. Year of expenditure costs assume an escalation of 3 percent per year from June 2019.

Table 6.5: Phase 1 High, Medium and Low O&M Costs by Year by Year (2019 \$ in Millions)

O&M Levels	2033	2034	2035	2040	2045	2050	2055	2060
High Operations and Maintenance Cost	557	1,085	1,139	1,197	1,200	1,216	1,215	1,228
Medium Operations and Maintenance Cost	509	992	1,041	1,094	1,097	1,111	1,111	1,122
Low Operations and Maintenance Cost	491	956	1,004	1,055	1,058	1,072	1,071	1,082

Table 6.5.1: Phase 1 High, Medium and Low O&M Costs by Year (YOE \$ in Millions)

O&M Levels	2033	2034	2035	2040	2045	2050	2055	2060
High Operations and Maintenance Cost	842	1,690	1,828	2,226	2,588	3,039	3,521	4,125
Medium Operations and Maintenance Cost	770	1,545	1,671	2,035	2,366	2,779	3,219	3,771
Low Operations and Maintenance Cost	742	1,489	1,611	1,962	2,282	2,679	3,104	3,636

LIFE CYCLE COST ESTIMATES

The life cycle costing methodology used in this 2020 Draft Business Plan compiles all operations, maintenance, rehabilitation and replacement expenditures that the Authority will incur on initial capital investments through 2060 for the Silicon Valley to Central Valley and Phase 1 lines. The costs summarized below are specific to rehabilitating and replacing initial capital investments. Operations and Maintenance costs are reported separately above. This model methodology is similar to that used in past business plans, which provides a "cash flow" estimate of the funds required for rehabilitation and replacement. It is important to note that capital rehabilitation and replacement costs are based upon component parts of the system, with different longevity and costs. This creates some variability in the amount of budget necessary in any given year to address these rehabilitation and replacement needs.

This Draft 2020 Business Plan estimate includes a consolidated annual expenditures review and reports the capital investments needs in five-year increments starting in 2040 through 2060. These estimates have changed since the 2018 Business Plan to account for the Silicon Valley to Central Valley operations beginning at the end of 2031.

In addition, a Monte Carlo analysis was conducted to evaluate a potential range of life cycle cost forecasts as shown in the tables below. The Monte Carlo methodology employed in 2018 also applies to this Draft 2020 Business Plan analysis. For more detailed information on this analysis, see the 50-Year Life Cycle Capital Cost Model Documentation Technical Supporting Document at https://hsr.ca.gov/docs/about/business_plans/2020_Business_Plan_50-Year_Lifecycle_Capital_Cost_Model.pdf.

Table 6.6: Silicon Valley to Central Valley High, Medium and Low Life Cycle Costs by Year (2019 \$ in Millions)

Level	2040	2045	2050	2055	2060
High Life Cycle Cost	0.10	43	118	130	631
Medium Life Cycle Cost	0.09	39	109	119	579
Low Life Cycle Cost	0.08	35	99	108	525

Table 6.6.1: Silicon Valley to Central Valley High, Medium and Low Life Cycle Costs by Year (YOY \$ in Millions)

Level	2040	2045	2050	2055	2060
High Life Cycle Cost	0.17	88	283	360	2,028
Medium Life Cycle Cost	.16	81	260	331	1,862
Low Life Cycle Cost	.14	73	236	300	1,689

Table 6.6.2: Silicon Valley to Central Valley High, Medium and Low Life Cycle Costs Cumulative Through 2060 (\$ in Millions)

Level	2019\$	YOY\$
High Life Cycle Cost	5,923	14,535
Medium Life Cycle Cost	5,438	13,345
Low Life Cycle Cost	4,933	12,105

*Net Cash Flow From Operations

NET CASH FLOW FROM OPERATIONS FORECAST

These estimates illustrate the potential net cash flows that could be available from operations that could be applied to future development costs or future financing. Net operating cash flow after capital replacement is determined by calculating the net cash flow from operations (revenue less operations and maintenance (O&M) costs). Revenues include those generated from high-speed rail passenger service (farebox revenue), feeder and connecting bus service, as well as ancillary revenues.

For this Draft 2020 Business Plan, ancillary revenues were further evaluated to provide financial support for system expansion, capital funding and ongoing operations and maintenance. In prior business plans, we carried planning assumptions that indicated that ancillary revenues could range

from 1 to 4 percent of farebox revenues. Since the 2018 Business Plan, the ETO performed a analysis on benchmarking and market analysis of potential ancillary revenue sources from the system's real property and rights of way, as well as passenger-generated opportunities. This refined analysis provides a basis of support for ancillary revenues at an average of 2 percent of farebox revenues for the period through 2060. Ancillary revenue contributions could include sources such as advertising, parking, retail concessions, sponsorships, and telecommunications.

For more information on this analysis, see the High, Medium and Low Cash Flow Analysis Technical Supporting Document at https://hsr.ca.gov/docs/about/business_plans/2020_Business_Plan_High_Medium_and_Low_Cash_Flow_Analysis.pdf.

Table 6.7: Net Operating Cash Flow Silicon Valley to Central Valley through Phase 1 High Case (YOE \$ in Millions)*

Year	2031	2032	2033	2034	2035
Total Revenue	91	1,167	1,746	3,708	4,468
Less: O&M	(54)	(671)	(842)	(1,690)	(1,828)
Net Cash Flow from Operations	36	496	904	2,018	2,640

Table 6.7.1: Net Operating Cash Flow Silicon Valley to Central Valley through Phase 1 Medium Case (YOE \$ in Millions)*

Year	2031	2032	2033	2034	2035
Total Revenue	62	797	1,200	2,623	3,164
Less: O&M	(50)	(614)	(770)	(1,545)	(1,671)
Net Cash Flow from Operations	12	183	430	1,079	1,493

Table 6.7.2: Net Operating Cash Flow Silicon Valley to Central Valley through Phase 1 Low Case (YOE \$ in Millions)*

Year	2031	2032	2033	2034	2035
Total Revenue	51	657	996	2,194	2,650
Less: O&M	(48)	(591)	(742)	(1,489)	(1,611)
Net Cash Flow from Operations	3	66	254	705	1,039

*Numbers may not add due to rounding.

■ BREAKEVEN ANALYSIS

The Breakeven Analysis measures the likelihood that farebox revenue is equal to or greater than operations and maintenance costs in a given operating year. A Monte Carlo analysis is used to conduct this review.

The Monte Carlo process begins by identifying a range of potential operating and maintenance costs and revenue outcomes. These inputs are used as inputs into a probability model that selects at random one value from cost and one value from revenue and calculates the results. The model conducts this calculation, selecting randomly each time, thousands of times to develop a random distribution of results.

The **tables and exhibits on page 151** summarize the results of this Monte Carlo analysis for three points in time:

- Silicon Valley to Central Valley opening year (2031);
- Phase 1 opening year (2033); and
- Phase 1 horizon year (2040).

Each table summarizes how often the model predicted that a certain value would occur. Each exhibit shows the range of results over all runs.

In 2018, this analysis showed a 79 percent probability that the Silicon Valley to Central Valley Line would cover its operations and maintenance costs on the year it opened (2029). That probability rose to 96 percent by the Phase 1 opening year of 2033, and greater than 99 percent by the 2040 horizon year. This analysis included only farebox revenues and would increase further if ancillary and other revenues were considered.

The 2020 Breakeven Analysis for Silicon Valley to Central Valley is slightly decreased over the previous 2018 Business Plan, reducing from 79 percent to 71 percent in the opening year. This is primarily caused by the increased operations and maintenance costs of the extension to Merced. The breakeven probability for the Phase 1 opening year is 83 percent and increases to greater than 99 percent by 2040.

It is important to note that these assumptions are used for forecasting and estimating purposes only. These figures will continue to change as operating costs are further refined, as ridership estimates change and as the schedule for construction become more certain for these lines.

Table 6.8.1: Silicon Valley to Central Valley Opening Year 2031 (2019 \$ in Millions)

Probability Distribution	Net Operating Cash Flow
10%	(8)
25%	(2)
Median	9
75%	21
90%	34

Exhibit 6.1: Breakeven Analysis Silicon Valley to Central Valley Opening Year (2031)

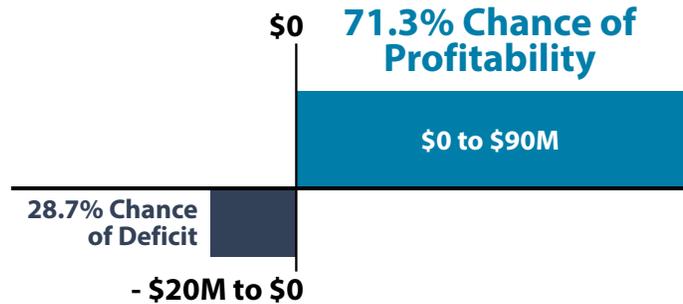


Table 6.8.2: Phase 1 Opening Year 2033 (2019 \$ in Millions)

Probability Distribution	Net Operating Cash Flow
10%	(58)
25%	59
Median	233
75%	453
90%	678

Exhibit 6.2: Breakeven Analysis Phase 1 Opening Year (2033)

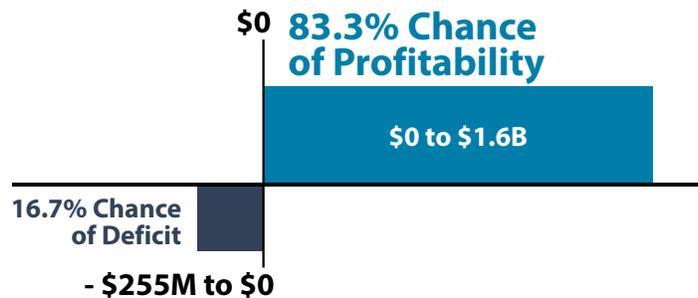


Table 6.8.3: Phase 1 Horizon Year 2040 (2019 \$ in Millions)

Probability Distribution	10%
10%	465
25%	861
Median	1,427
75%	2,108
90%	2,802

Exhibit 6.3: Breakeven Analysis Phase 1 Horizon Year (2040)

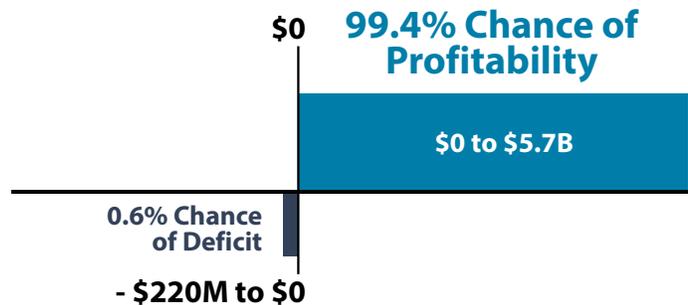




Photo: Major support structure for San Joaquin River Viaduct

APPENDICES

APPENDIX A. STATUTORY REQUIREMENTS FOR A BUSINESS PLAN

This Draft 2020 Business Plan summarizes the progress we have made over the last two years, updates information and forecasts that were presented in our 2018 Business Plan and identifies key milestones and decisions we anticipate making over the next few years.

The Authority's governing statutes are established in the California Public Utilities Code sections 185000-185038; Section 185033, as amended by Assembly Bill (AB) 528 (Lowenthal, Chapter 237, Statutes of 2013), lays out the requirements for the draft business plan and they are as follows:

185033.⁴ (a) The authority shall prepare, publish, adopt, and submit to the Legislature, not later than May 1, 2014, and every two years thereafter, a business plan. At least 60 days prior to the publication of the plan, the authority shall publish a draft business plan for public review and comment. The draft plan shall also be submitted to the Senate Committee on Transportation and Housing, the Assembly Committee on Transportation, the Senate Committee on Budget and Fiscal Review, and the Assembly Committee on Budget.

(b) (1) The draft business plan shall include, but need not be limited to, all of the following elements:

(A) A description of the type of service the authority is developing and the proposed chronology for the construction of the statewide high-speed rail system, and the estimated capital costs for each segment or combination of segments.

(B) A forecast of the expected patronage, service levels, and operating and maintenance costs for

the Phase 1 corridor as identified in paragraph (2) of subdivision (b) of Section 2704.04 of the Streets and Highways Code and by each segment or combination of segments for which a project level environmental analysis is being prepared for Phase 1. The forecast shall assume a high, medium, and low level of patronage and a realistic operating planning scenario for each level of service.

(C) Alternative financial scenarios for different levels of service, based on the patronage forecast in subparagraph (B), and the operating break-even points for each alternative. Each scenario shall assume the terms of subparagraph (J) of paragraph (2) of subdivision (c) of Section 2704.08 of the Streets and Highways Code.

(D) The expected schedule for completing environmental review, and initiating and completing construction for each segment or combination of segments of Phase 1.

(E) An estimate and description of the total anticipated federal, state, local, and other funds the authority intends to access to fund the construction and operation of the system, and the level of confidence for obtaining each type of funding.

(F) Any written agreements with public or private entities to fund components of the high-speed rail system, including stations and terminals, and any impediments to the completion of the system.

(G) Alternative public-private development strategies for the implementation of Phase 1.

(H) A discussion of all reasonably foreseeable risks the project may encounter, including, but not limited to, risks associated with the project's finances, patronage, right-of-way acquisition, environmental clearances, construction, equipment, and technology, and other risks associated with the project's development. The plan shall describe the

authority's strategies, processes, or other actions it intends to utilize to manage those risks.

(2) To the extent feasible, the draft business plan should draw upon information and material developed according to other requirements, including, but not limited to, the preappropriation review process and the preexpenditure review process in the Safe, Reliable High-Speed Passenger Train Bond Act for the 21st Century pursuant to Section 2704.08 of the Streets and Highways Code. The authority shall hold at least one public hearing on the draft business plan and shall adopt the plan at a regularly scheduled meeting. When adopting the plan, the authority shall take into consideration comments from the public hearing and written comments that it receives in that regard, and any hearings that the Legislature may hold prior to adoption of the plan.

All of these requirements are addressed in this Draft 2020 Business Plan. The Appendices include a listing of the plan sections and/or supporting technical memos that correspond to each of these requirements. These documents can be found at the following URL: https://www.hsr.ca.gov/about/business_plans/business_plan_2020.aspx

APPENDIX B. MEETING BUSINESS PLAN STATUTORY REQUIREMENTS

Public Utilities Code Section 185033 Requirements	Response to Requirements and Location
<p>The Authority shall prepare, publish, adopt, and submit to the Legislature, not later than May 1, 2018, and every two years thereafter, a business plan.</p>	<p>This is the Draft 2020 Business Plan. The Final 2020 Business Plan was adopted on XXXX, 2020, and was submitted to the Legislature on XXXX, 2020.</p>
<p>At least 60 days prior to the publication of the plan, the Authority shall publish a draft business plan for public review and comment.</p>	<p>The Draft 2020 Business Plan was released on February 12, 2020.</p>
<p>The draft plan shall also be submitted to the Senate Committee on Transportation and Housing, the Assembly Committee on Transportation, the Senate Committee on Budget and Fiscal Review, and the Assembly Committee on Budget.</p>	<p>The Draft 2020 Business Plan was submitted on February 12, 2020.</p>
<p>A description of the type of service the Authority is developing.</p>	<p>Chapter 3</p>
<p>The proposed chronology for the construction of the statewide high-speed rail system.</p>	<p>Chapter 3, Chapter 4</p>
<p>The estimated capital costs for each segment or combination of segments.</p>	<p>Chapter 3, Chapter 4</p>
<p>A forecast of the expected patronage, service levels, and operating and maintenance costs for the Phase 1 corridor as identified in paragraph (2) of subdivision (b) of Section 2704.04 of the Streets and Highways Code and by each segment or combination of segments for which a project level environmental analysis is being prepared for Phase 1. The forecast shall assume a high, medium, and low level of patronage and a realistic operating planning scenario for each level of service.</p>	<p>Chapter 6</p>
<p>Alternative financial scenarios for different levels of service, based on the patronage forecast in subparagraph (above), and the operating breakeven points for each alternative. Each scenario shall assume the terms of subparagraph (J) of paragraph (2) of subdivision (c) of Section 2704.08 of the Streets and Highways Code.</p>	<p>Chapter 6</p>

Public Utilities Code Section 185033 Requirements	Response to Requirements and Location
<p>The expected schedule for completing environmental review, and initiating and completing construction for each segment or combination of segments of Phase 1.</p>	<p>Chapter 2, Chapter 3</p>
<p>An estimate and description of the total anticipated federal, state, local, and other funds the authority intends to access to fund the construction and operation of the system, and the level of confidence for obtaining each type of funding.</p>	<p>Chapter 3, Chapter 4</p>
<p>Any written agreements with public or private entities to fund components of the high-speed rail system, including stations and terminals, and any impediments to the completion of the system.</p>	<p>Chapter 3</p>
<p>Alternative public-private development strategies for the implementation of Phase 1.</p>	<p>Chapter 4</p>
<p>A discussion of all reasonably foreseeable risks the project may encounter, including, but not limited to, risks associated with the project’s finances, patronage, right-of-way acquisition, environmental clearances, construction, equipment, and technology, and other risks associated with the project’s development. The plan shall describe the authority’s strategies, processes, or other actions it intends to utilize to manage those risks.</p>	<p>Chapter 5</p>
<p>To the extent feasible, the draft business plan should draw upon information and material developed according to other requirements, including, but not limited to, the pre-appropriation review process and the pre-expenditure review process in the Safe, Reliable High-Speed Passenger Train Bond Act for the 21st Century pursuant to Section 2704.08 of the Streets and Highways Code</p>	<p>Chapter 3, Chapter 4</p>
<p>The Authority shall hold at least one public hearing on the draft business plan and shall adopt the plan at a regularly scheduled meeting.</p>	<p>Public comment will be taken at the regularly scheduled Board of Directors meetings on February 18, 2020, and March 17, 2020. The Final Draft 2020 Business Plan will be adopted at the April 21, 2020, meeting.</p>
<p>When adopting the plan, the Authority shall take into consideration comments from the public hearing and written comments that it receives in that regard, and any hearings that the Legislature may hold prior to adoption of the plan.</p>	<p>To be considered by the Authority in preparing final plan.</p>



Photo: Construction workers assemble column support at the Kansas Avenue project site.

APPENDIX C. ACRONYMS AND ABBREVIATIONS

Acronym	Definition
ARRA	American Recovery and Reinvestment Act
ARTIC	Anaheim Regional Transportation Intermodal Center
BART	Bay Area Rapid Transit
BNSF	BNSF Railway
BPM-V3	Business Plan Model - Version 3
CalSTA	California State Transportation Agency
Caltrans	California Department of Transportation
CBA	Community Benefits Agreement
CEQA	California Environmental Quality Act
CP 1	Construction Package 1
CP 2-3	Construction Packages 2-3
CP 4	Construction Package 4
DBE	Disadvantaged Business Enterprise
DVBE	Disabled Veteran Business Enterprise
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
ETO	Early Train Operator
FRA	Federal Railroad Administration
GGRF	Greenhouse Gas Reduction Fund (a.k.a. Cap-and-Trade proceeds)
GHG	Greenhouse Gas
LAO	Legislative Analyst's Office
Link US	Link Union Station Project
LOSSAN Corridor	Los Angeles–San Diego–San Luis Obispo Rail Corridor
Metro	Los Angeles County Metropolitan Transportation Authority
MOU	Memorandum of Understanding
NEPA	National Environmental Policy Act
PFAL	Project Finance Advisory, Ltd.
PRG	Peer Review Group
PTC	Positive Train Control
SCC	Standard Cost Category
TIRCP	Transit and Intercity Rail Capital Program
UIC	International Union of Railways
UPRR	Union Pacific Railroad
VMT	Vehicle Miles Traveled
YOE	Year of Expenditure



Photo: San Juan River Viaduct support columns

APPENDIX D. HISTORY OF HIGH-SPEED RAIL

California has evaluated the potential for high-speed rail for several decades. The state first pursued the idea of a Southern California high-speed rail corridor working with Japanese partners in 1981 under Governor Edmund Gerald "Jerry" Brown Jr. In the mid-1990s, planning began in earnest as California's growing population put an increasing strain on its highways, airports and conventional passenger rail lines.

At the federal level, as part of the High-Speed Rail Development Act of 1994 (<https://www.govtrack.us/congress/bills/103/hr4867>), authored by then-U.S. Representative Lynn Schenk, California was identified as one of five corridors nationally for high-speed rail planning. The California Legislature created the Intercity High-Speed Rail Commission in 1993, charging the Commission with determining the feasibility of a system in California. In 1996, the Commission issued a report that concluded that such a project was indeed feasible.

California's Legislature passed the High-Speed Rail Act in 1996 (http://leginfo.ca.gov/pub/95-96/bill_sen/sb_1401-1450/sb_1420_bill_960924_chaptered.html), a bill that created the High-Speed Rail Authority (Authority) and charged the Authority with preparing a plan and design for constructing a system to connect the state's major metropolitan areas. In 2002, following the release of the Authority's first business plan in 2000, Senate Bill 1856 (Costa) was passed and signed by Governor Gray Davis. The legislation authorized a \$9.95 billion bond measure to fund the system, but submitting that measure to the state's voters was delayed several years.

In the interim, the Authority, together with its federal partner, the Federal Railroad Administration (FRA), issued a Draft Program-Level Environmental Impact Report/Environmental Impact Statement (EIR/EIS) that described the system and its potential impacts on a statewide scale. Through that process, the Authority received and reviewed more than 2,000 public and government agency comments on the draft document, which were used to determine the preferred corridors and stations for the system.

In November 2008, the state's voters approved Proposition 1A, a bond measure authored by then-Assemblymember Cathleen Galgiani and signed by Governor Arnold Schwarzenegger, making it the nation's first-ever, voter-approved financing mechanism for high-speed rail.

In 2009, \$8 billion in federal funds were made available to high-speed rail projects nationwide as part of the American Recovery and Reinvestment Act (ARRA), which was passed to help stimulate the economy, create new jobs, and foster development of new rail manufacturing enterprises. California sought and successfully secured \$3.3 billion in ARRA funds and other funds made available through federal appropriations and grants for planning and environmental work, as well as final design and construction of the first section in the Central Valley, which is underway.

In 2012, the Authority adopted its 2012 Business Plan, which laid out a framework for implementing the California high-speed rail system in concert with other state, regional and local rail investments, as part of a broader statewide rail modernization program. In that same year, the Legislature approved – and Governor Brown signed into law – Senate Bill 1029 (Budget Act of 2012) approving almost \$8 billion in federal and state funds for the construction of the first high-speed rail investment in the Central Valley, to advance design and planning for Phase 1 and Phase 2 of the system and bookend and connectivity projects throughout the state.

In 2014, the Authority adopted its 2014 Business Plan, which built on and updated the 2012 Business Plan, implementing the requirements of Senate Bill 1029. Also in 2014, the Legislature and Governor Brown reaffirmed their commitment to the program by providing an ongoing funding stream through the state’s Greenhouse Gas Reduction Fund.

In 2015, Governor Brown and supporters celebrated the historic groundbreaking of the high-speed rail program at the site of the future station in downtown Fresno, marking the beginning of what will be America’s first true high-speed rail system.

The Authority adopted its 2016 Business Plan, which introduced the Silicon Valley to Central Valley Line and built on the 2014 Business Plan, implementing the requirements of Senate Bill 1029.

In July 2017, the Legislature voted to extend the Cap-and-Trade program through 2030, ensuring long-term state funding for the high-speed rail program from the state’s Greenhouse Gas Reduction Fund.

In October 2017, the Authority met federal American Recovery and Reinvestment Act requirements by fully investing the more than \$2.55 billion granted to the state to build the nation’s first high-speed rail system.

Several years have passed since the official groundbreaking. As of late 2017, 119 miles of construction activities are underway in the Central Valley. In addition, design and environmental planning has advanced on the Phase 1 system between San Francisco and Los Angeles/Anaheim along with outreach to communities and stakeholders.

In 2018, under the direction of new Chief Executive Officer Brian Kelly, the Authority continued to make significant progress on the project. In October, the Authority’s Board of Directors approved the Locally Generated Alternative—the 23-mile section that will bring high-speed rail into downtown Fresno. In October and November, the Board demonstrated its commitment to bringing high-speed rail to Southern California by moving the process forwards in selecting alignments from Bakersfield to the Los Angeles/Anaheim area.

Early 2019 was a busy time for high-speed rail. Newly-appointed Governor Newsom voiced his support of continuing with the high-speed rail program by focusing on completing a 171-mile line between Merced to Bakersfield that would run true, high-speed electric, clean trains, and would allow for connections to points to Sacramento, the Bay Area and Southern California. In addition, he committed to bringing new leadership and transparency to the Authority and announced the appointment of Lenny Mendonca to the Board. Shortly thereafter, the Board of Directors elected Mr. Mendonca as the new Board Chair.

The beginning of the year also saw the completion of one of the major construction projects in the Central Valley, when the Authority and Caltrans celebrated the completion of the State Route 99 realignment project that moved the main artery through central Fresno 100 feet to the west in anticipation of high-speed rail tracks. This project replaced two overpasses, improved pedestrian access and traffic patterns.

In another major 2019 milestone, Governor Newsom and the Federal Railroad Administration (FRA) signed a Memorandum of Understanding (MOU), by which the Authority was assigned FRA's responsibilities as lead agency under the National Environmental Policy Act (NEPA). The NEPA Assignment MOU provides environmental review responsibilities under NEPA and other federal environmental laws with respect to projects in California's high-speed rail system and projects that directly connect to stations on the high-speed rail system, which include the Link Union Station (Link US) Project and West Santa Ana Branch Transit Corridor projects in Los Angeles. These federal responsibilities will be performed by the California High-Speed Rail Authority, with oversight by the California State Transportation Agency (CalSTA).

The Authority also saw major progress on the economic front when it crossed the 500 mark for certified small businesses playing a role in construction high-speed rail. And in early September, the Authority announced that it had created 3,000 construction jobs since work began in the Central Valley. The number stands at more than 3,500 today.

In September, the Authority reaffirmed its commitment to progress in Southern California. Together with CalSTA and the Los Angeles County Metropolitan Transportation Authority (Metro), an agreement was reached to steer more than

\$400 million in Proposition 1A funds toward the transformative Link US project.

In late fall, the Authority issued the Record of Decision for the final 23-mile route between Shafter and Bakersfield in the Central Valley. This completes the state's environmental review process between Fresno and Bakersfield and allows the Authority to move toward project construction into Bakersfield and was the first major environmental action taken under the State's newly granted federal National Environmental Policy Act (NEPA).

In December 2019, the Authority issued Request for Proposals for the Track and Systems procurement. This procurement will allow the Authority to start laying track in the Central Valley on top of the civil work, and starts the process to electrify the system. Proposals are due to the Authority in June 2020, with work scheduled to start that fall.

■ APPENDIX E. ENDNOTES

- 1 European Commission, Directorate General of Transport, "Interaction between High Speed and Air passenger Transport," April 1996.
- 2 Valley Children's Hospital, Hospital Council of Northern and Central California; "Community Health Needs Assessment Report 2016; Fresno, Kings, Madera and Tulare Counties" https://www.valleychildrens.org/media/file/Valley%20Children's%20CHNA%202016_2.pdf
- 3 California Air Resources Board, "California Greenhouse Gas Emissions for 2000 to 2017 Trends of Emissions and Other Indicators"
- 4 Source: Public Utilities Code Section 185033, http://leginfo.legislature.ca.gov/faces/codes_displaySection.xhtml?lawCode=PUC§ionNum=185033



Draft 2020 Business Plan



CALIFORNIA
High-Speed Rail Authority

California High-Speed Rail Authority

770 L Street, Suite 620, Sacramento, CA 95814 • (916) 324-1541

info@hsr.ca.gov • www.hsr.ca.gov • www.buildhsr.com



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