

23 Business and Organization Comments

Part 2 of 4

Submission 241 (Michael Claiborne, Leadership Counsel for Justice and Accountability (For Fairmead Community & Friends), June 21, 2019)

Attached are the exhibits associated with the comment letter just submitted

on behalf of Fairmead Community & Friends.

Regards,

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EXHIBIT A

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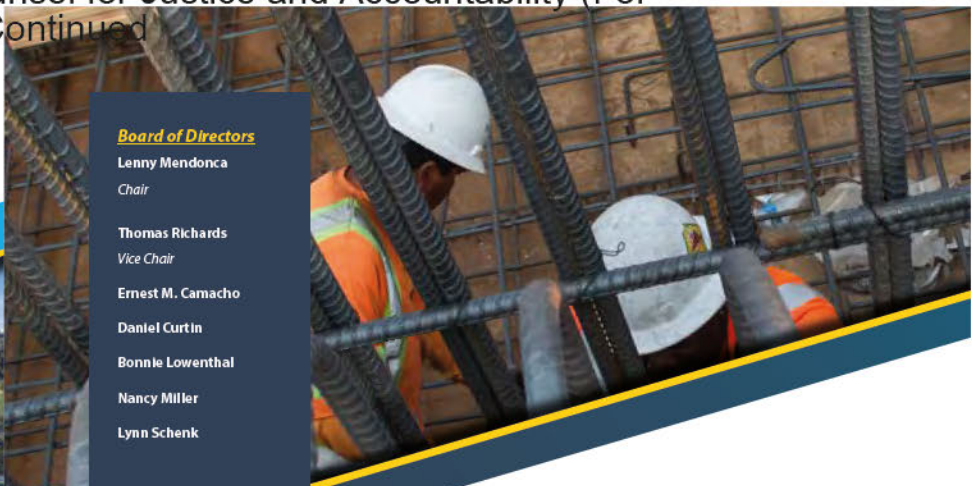


2019

Delivering High-Speed Rail to Californians

Project Update Report to the California State Legislature

hsr.ca.gov



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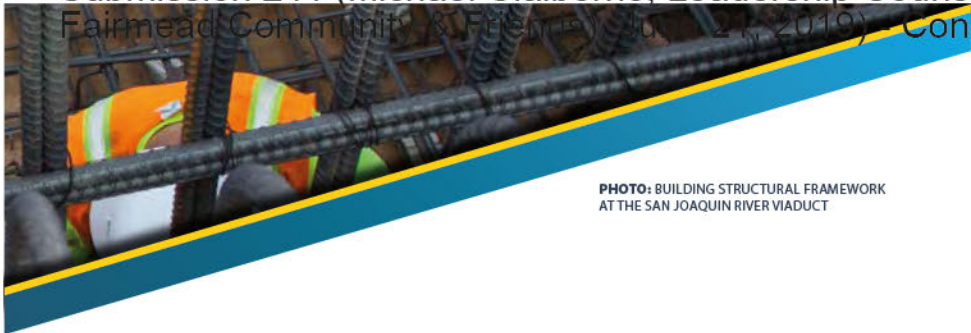
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The California High-Speed Rail Authority (Authority) is responsible for planning, designing, building and operating the first high-speed rail in the nation. California high-speed rail will connect the mega-regions of the state, contribute to economic development and a cleaner environment, create jobs and preserve agricultural and protected lands. When it is completed, it will run from San Francisco to the Los Angeles basin in under three hours at speeds capable of exceeding 200 miles per hour. The system will eventually extend to Sacramento and San Diego, totaling 800 miles with up to 24 stations. In addition, we are working with regional partners to implement a statewide rail modernization plan that will invest billions of dollars in local and regional rail lines to meet the state's 21st century transportation needs.

Submission 241 (Michael Claiborne, Leadership Counsel for Justice and Accountability (For Fairmead Community & Friends) (May 2, 2019)) Continued



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PHOTO: BUILDING STRUCTURAL FRAMEWORK AT THE SAN JOAQUIN RIVER VIADUCT

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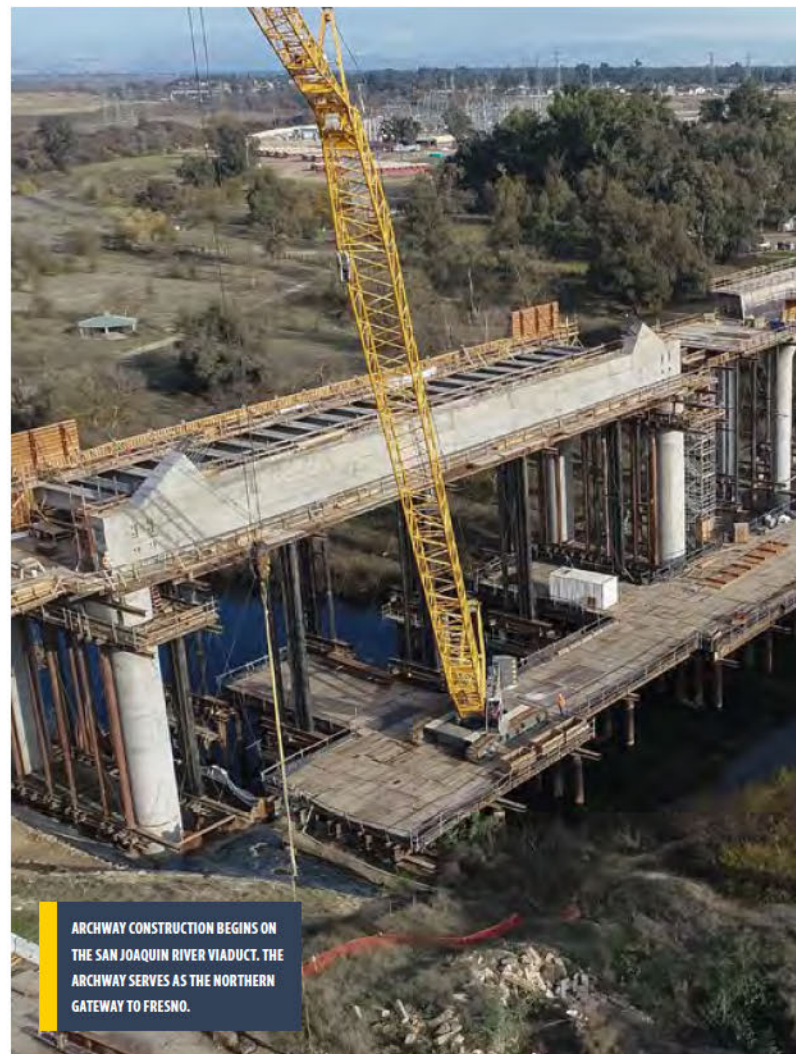
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LETTER FROM THE BOARD CHAIR

California's High-Speed Rail project is at a crossroads, and this 2019 Project Update Report lays out how the Authority plans to move the project forward in the months and years ahead.

For years, the idea of a high-speed rail line connecting the two most populous regions of the state, through the Central Valley, was championed by political and civic leaders. Then, after a vote of the people, a project was put forward and carried out by Republican and Democratic administrations. That project, California High-Speed Rail, has created tens of thousands of jobs, supported hundreds of small businesses, contributed to \$3 billion in wages and \$76 billion in economic output – much of it in the Central Valley. Voters approved the project because it was our best – and perhaps only – chance to connect Northern and Southern California in an environmentally sound way.

But any assessment of the history of this project underscores the deeply entrenched challenges that it has faced. The initial cost projections and timelines were simply unrealistic. In 2008, voters were told the project would cost \$45 billion. Now, the actual cost appears closer to \$80 billion. The federal government chose that the project begin in the Central Valley nearly a decade ago when it deemed that segment worthy of federal funding.

Having spent more than a decade and billions of dollars, high-speed rail is under construction – progress you can see throughout the Central Valley. And in this document, you will find a report that focuses the limited resources the state has identified to get a working section that can demonstrate the viability of the broader project.

Some have suggested the state should walk away from the more than a decade of collaboration and progress



that Republican and Democratic administrations and a generation of legislative leaders have made to bring the project this far. Such a path would leave California, having spent \$5 billion, with nothing but lawsuits, job losses and billions of IOU's with nothing to show for our debts.

Given those two options, the path forward is clear. The California High-Speed Rail Authority (Authority) will continue its efforts toward getting a working section completed in a responsible and transparent way.

Already, the Newsom administration has made the project more transparent and accountable to the people of this state. During his first month in office, the Governor demanded change orders, cost overruns and travel expenses be made publicly available and

published on the high-speed rail website. In his May Budget Revis proposal, the Governor will announce that critical oversight and management functions will be brought back in-house, replacing consultants with state staff. The Authority will also initiate an office-by-office review of other functions more appropriately performed by state officials – not private consultants.

In keeping with that commitment to transparency, this update estimates the cost for the Bakersfield-Fresno-Merced section, regional bookend investments and Phase I (San Francisco to Anaheim) environmental clearance at \$20.4 billion, all while acknowledging that -- as with any major infrastructure project -- those costs could rise with unpredictable developments.

Submission 241 (Michael Claiborne, Leadership Counsel for Justice and Accountability (For Fairmead Community & Friends), June 21, 2019) - Continued



This report lays out the path forward for the Merced-Fresno-Bakersfield line, a building block project that matches the available funding. The line will provide a significant economic boost to fast-growing and dynamic parts of our state, anchoring an ambitious economic development vision for rural resilience in the Central Valley.

Further, the Authority is committed to bookend investments in both Northern and Southern California and completion of environmental work for the length of the San Francisco to Los Angeles/Anaheim corridor.

And all of this is done with the goal of delivering a working section, demonstrating the project's feasibility and attracting other funding to complete the line north to south.

Independent, third-party analysis by the Early Train Operator confirms the decision to focus first on the Merced-Fresno-Bakersfield line as the best option to increase ridership and get an operational segment up and running.

That building block approach is what this report details today.

Respectfully,

A handwritten signature in black ink that reads "Lenny Mendonca".

Lenny Mendonca
Authority Board of Directors Chair

About This Report

This is the California High-Speed Rail Authority's 2019 Project Update Report. This report fulfills the Authority's biennial requirement to update the California Legislature on the development and implementation of intercity high-speed rail service.

In July 2012, the California Legislature approved—and Governor Brown signed into law—Senate Bill 1029 (Budget Act of 2012). SB 1029 appropriated almost \$8 billion in federal and state funds to construct the first high-speed rail segments in the Central Valley and to fund 15 bookend and connectivity projects throughout California. SB 1029 also put into place reporting requirements to ensure legislative oversight of the

project. The requirement for a project update report was updated by Assembly Bill 95 in June 2015.

This 2019 Project Update Report provides comprehensive reviews of:

- Progress made on the high-speed rail project since the 2017 Project Update Report;
- Project updates since the 2018 Business Plan; and
- What we learned in the months since the 2018 Business Plan was published.



PHOTO: CEO BRIAN KELLY TOURING A CENTRAL VALLEY CONSTRUCTION SITE.

Submission 241 (Michael Claiborne, Leadership Counsel for Justice and Accountability (For Fairmead Community & Friends), June 21, 2019) - Continued

Inside

Chapter 1, Analysis of Early Service: A review of what the Authority learned after the Early Train Operator (ETO) completed its analysis of the feasibility of two separate high-speed rail lines—one in the Central Valley and another from San Francisco to Gilroy—as candidates for early, interim service. This analysis is a commitment the Authority made in its 2018 Business Plan.

Chapter 2, Capital Cost Review: A summary of what the Authority learned after receiving the results of additional cost estimate reviews and risk analyses. These reviews and analyses, also a commitment the Authority made in its 2018 Business Plan, include an construction cost estimate review conducted by the Early Train Operator, an expanded Monte Carlo risk analysis to determine if the Authority's range-based approach should be updated or further adjusted, and work to further define risk areas and detailed mitigation strategies.

Chapter 3, Funding and Affordability: An overview of the funding that is currently available to the Authority and the funding that is projected to be available in the future compared to our capital cost estimate. This discussion includes the funding available to deliver the scope of work under the federal grant agreement and to meet our commitments to our regional partners for the bookend projects. This chapter also discusses our ability to deliver an interim operating segment in the Central Valley.

Chapter 4, Implementation Plan: A discussion of our policy recommendations to deliver early service in the Central Valley, linking Merced, Fresno and Bakersfield. This intercity service would operate on high-speed rail assets and would integrate with existing regional rail service at Merced and bus connections at Bakersfield.

Chapter 5, Program Issues: A review of the programmatic issues that the Authority continues to monitor and manage including disengagement by the Federal Railroad Administration, our response to the recent State Audit Report, enhancements to our organizational capacity and our mitigation efforts to resolve issues related to right-of-way and third-party agreements.

Chapter 6, Program Risk: An examination of the ongoing programmatic risks that the Authority continues to monitor and manage. These include funding, cost and schedule risk and other risks, and our ongoing risk-management efforts.

Chapter 7, Program and Regional Summaries: A summary of our progress on planning for the Silicon Valley to Central Valley Line and for Phase 1 and Phase 2 of the high-speed rail system. This summary also presents regional summaries of activities in Northern California, the Central Valley and Southern California. The program summary and each regional summary discusses major accomplishments, milestones achieved and milestones to follow.

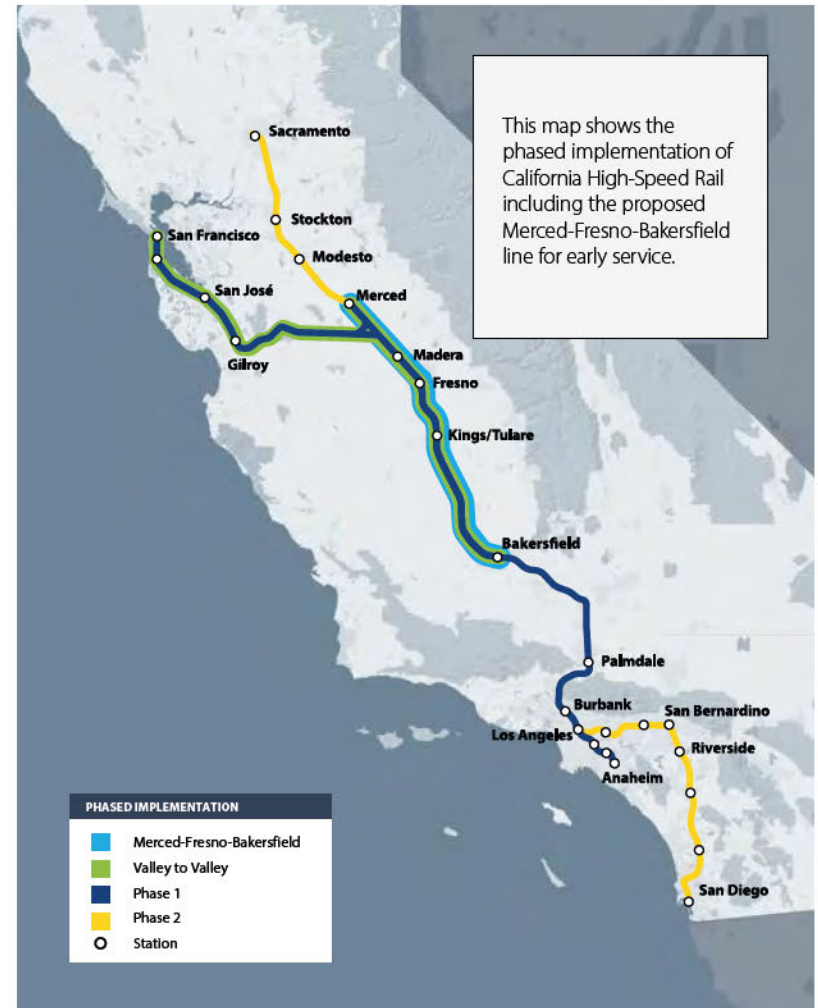


EXHIBIT 1.0: PHASED IMPLEMENTATION MAP

Submission 241 (Michael Claiborne, Leadership Counsel for Justice and Accountability (For Fairmead Community & Friends), June 21, 2019) - Continued

Chapter 1: Early Interim Service Analysis



CHAPTER 1: EARLY INTERIM SERVICE ANALYSIS

The 2018 Business Plan identified three key objectives that guide Authority decisions:

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

To achieve this, CEO Brian Kelly stated the Authority's intent to evaluate options to put high-speed rail assets to use that will provide benefits to Californians.

Those benefits would include reduced travel times on existing passenger rail systems, expanded clean electrified rail service and preparation for testing high-speed rail operations.

Both the 2016 and 2018 Business Plans have consistently articulated that service on a Silicon Valley to Central Valley Line (Valley to Valley Line) is the shortest line that would meet the financial requirements to cover operation and maintenance costs. The 2018 Business Plan indicated that this line would take nearly 15 years to complete, assuming the availability of full funding. Given this, the Authority recommended implementing passenger service incrementally, aligned with a "building block" approach to construction.

Chapter 1: Early Interim Service Analysis

This has been a subject of discussion with the Federal Railroad Administration (FRA) since 2013. The grant agreements envision passenger service using the Central Valley Segment now under construction. The agreements state that passenger services would be provided either as part of a longer high-speed operational line, such as the Silicon Valley to Central Valley Line, or as a shorter interim service prior to full-scale high-speed rail operations. Any early passenger train service would be interim until funding is available to complete the Silicon Valley to Central Valley Line.

The CEO asked the Early Train Operator (ETO) to complete an analysis of two separate potential interim early service building blocks within the Silicon Valley to Central Valley Line—one within the Central Valley and another from San Francisco to Gilroy. The purpose of this analysis was to determine the costs and early passenger service benefits.

DB Engineering and Consulting USA (the United States arm of Deutsche Bahn AG, the entity that runs high-speed rail in Germany) was selected to be the ETO and placed under contract in late 2017. The ETO is assisting the Authority with planning, designing and implementing the nation's first high-speed rail program. The 2016 Business Plan articulated the Authority's desire to engage an ETO to seek its perspective is considered in the planning and design of track, systems, high-speed trains (rolling stock), and stations. Engaging an operator in early decisions on safety, operations, equipment and systems, fare structures and schedules, as well as other commercial and operating elements will ensure that the system is designed to operate as a safe and successful enterprise.

The ETO completed its initial work; going forward, additional service and financial analysis on interim services will be necessary. Specifically, financial reviews in past Business Plans consistently treated the

revenues and costs of the high-speed rail operations as a stand-alone business for purposes of determining a revenue-neutral operational segment. Historically, this analysis has not considered the additional net revenue that may be generated from the possible use of high-speed rail capital assets by others or from revenue sharing agreements derived from joint ticketing of integrated services, such as a Journey starting on Amtrak and then continuing on high-speed rail.

History of Interim Service

In parallel with the funding history described in **Chapter 3, Funding and Affordability**, implementation strategies for California's high-speed rail system also evolved over time. Once the Authority secured federal funds through the Federal Railroad Administration's ARRA and FY 10 grant programs, the high-speed rail program changed from a planning-only organization to an organization that included both planning and construction of elements necessary to eventually operate a high-speed train system.

Although the different strategies reordered sequencing priorities, one idea remained constant: implementing the high-speed rail system in phases. From the Revised 2012 Business Plan to this 2019 Project Update Report, the Authority has always considered an interim passenger train Central Valley service plan. That is because, without full funding to complete an operable segment, there could be a period during which a Central Valley interim service is necessary to make use of the infrastructure that has been built, avoiding "stranded assets" and, more importantly, to provide the most valuable early passenger train service benefits for the State of California.

Submission 241 (Michael Claiborne, Leadership Counsel for Justice and Accountability (For Fairmead Community & Friends), June 21, 2019) - Continued

Chapter 1: Early Interim Service Analysis

Of course, these assets will be suitable and ready for Authority high-speed rail operations once the Central Valley is connected to the Silicon Valley. However, the Authority has always contemplated that, as the civil infrastructure advances in the Central Valley, there might be a decision point, based on an assessment of available funding, on whether to make Central Valley interim passenger service decisions. The grant agreement has historically included language to this effect. The Authority now finds itself at that decision point.

2012 Business Plan

In 2012, the Legislature appropriated both Proposition 1A and federal funds for the 119-mile Central Valley construction. The Authority divided the construction into three design-build contracts for the civil infrastructure that could be used by intercity passenger rail in the near term and, eventually, would be used by an Authority-operated high-speed rail system. At that time, the first initial operating section (IOS) was defined as the shortest, non-subsidized high-speed rail line that could be operated by the Authority.

The Revised 2012 Business Plan identified two potential initial operating segments (IOS):

- IOS-North from Bakersfield to San José; and
- IOS-South from the Central Valley to the San Fernando Valley.

The Central Valley was part of both the IOS-South and the IOS-North. IOS-S was identified as the preferred implementation strategy by the Board of Directors. This implementation strategy could be realized only if significant additional funding was secured. Only

approximately \$6 billion in construction funds were secured, but the total estimated cost range for IOS-S was \$27- \$31 billion.

A phased approach to system development was described as the prudent course to build a foundation that allows for greater efficiency in the use of private investment once the initial segments of the system are in place. Private sector operation was envisioned at that time and is envisioned now. As part of phased implementation, the assets built in the Central Valley could be used by an interim passenger train operator until additional funding became available. This approach was memorialized in the federal grant agreements. Specifically, the diesel San Joaquin intercity passenger trains, which operate on shared freight rail tracks, could be shifted to the high-speed rail tracks to realize a reduced passenger train travel time in the Central Valley between the termini of the assets built.

2014 Business Plan

The 2014 Business Plan identified hope for additional funding because Governor Jerry Brown submitted his 2014-15 Proposed Budget to the Legislature, proposing to invest Cap-and-Trade proceeds to help fund the program. The first IOS was still defined as IOS-South from the Central Valley to the San Fernando Valley. At that time, design and construction work was underway on the first segment of IOS-South in the Central Valley.

The additional Cap-and-Trade funding in 2014 prompted a new look at the IOS-South, which was more expensive than the IOS-North.

Chapter 1: Early Interim Service Analysis

2016 Business Plan

In its 2016 Business Plan, the Authority adopted the Silicon Valley to Central Valley Line (Valley to Valley) as the preferred first Authority operated non-subsidized high-speed rail segment. Valley to Valley (formally described as IOS-N) was then defined as San José to Poplar Avenue (north of Bakersfield). This change occurred because the Valley to Valley segment was lower in cost when compared to the IOS-S, could be completed sooner, and could therefore generate operating revenue sooner.

The Authority considered that Cap-and-Trade, as a continuous appropriation, had the potential as a long-term revenue stream to support earlier completion of an Authority-operated high-speed rail segment. That potential was based on changes that would be needed to the Cap-and-Trade Program to allow for financing against proceeds. Had those changes occurred, and with federal funds and Proposition 1A bond funds, the Authority determined that it had the potential to provide total funding necessary to complete Valley to Valley. However, those changes did not materialize.

2018 Business Plan

In its 2018 Business Plan, the Authority's phased implementation strategy shifted slightly to define the Silicon Valley to Central Valley Line as service between San Francisco and downtown Bakersfield. Still, the strategy reiterated the Authority's intent to develop an initial line connecting the Silicon Valley to the Central Valley as soon as possible.

In addition, the San Francisco to Bakersfield line has stronger ridership potential and higher commercial value than the shorter line between San José and Poplar Avenue (north of Bakersfield) laid out in the 2016 Business Plan.

However, the 2018 Business Plan indicated that there was not sufficient funding to complete the Valley to Valley Line with currently available and committed funding. Therefore, the Authority stated its intent to seek the support of the ETO in evaluating the potential for an interim service in the Central Valley to provide early benefits until the Valley to Valley Line was fully funded. In the months since the 2018 Business Plan was published, we gathered a significant amount of new information. The ETO has played an important role in these efforts.

Early Train Operator's Analysis of Early Service

The 2018 Business Plan committed to reaching farther than the first 119-mile segment funded by the federal grants. A line connecting to Bakersfield would provide greater ridership and revenue and deliver an increased overall economic impact throughout the Central Valley. The plan also committed to evaluating an extension to Merced to link with other passenger services proposed for expansion by both the San Joaquin Regional Rail Commission (SJRRCC), which manages the Altamont Corridor Express (ACE), and the San Joaquin Joint Powers Authority (SJJPA), which oversees the San Joaquins service. A line making key connections to the expanded services would be more productive, provide greater travel opportunities and be more meaningful to the Central Valley than the shorter Madera to Poplar/Wasco segment.

In addition, the ACE and San Joaquins services expansion received a major commitment of funding from the state Transit and Intercity Rail Capital Program (announced in April 2018)—a commitment from all sources exceeding \$1.3 billion and enabling much better connected services to be operated to Merced from both the Bay Area and Sacramento.

Submission 241 (Michael Claiborne, Leadership Counsel for Justice and Accountability (For Fairmead Community & Friends), June 21, 2019) - Continued

Chapter 1: Early Interim Service Analysis

Based on programmatic guidance, the ETO conducted an initial analysis of high-speed train interim service options to utilize, at the earliest possible time, assets constructed by the Authority. As part of its analysis, the ETO evaluated the following:

- Potential early operation of Merced to Bakersfield or San Francisco to Gilroy segments as identified in the 2018 Business Plan;
- In consultation with the California State Transportation Agency (CalSTA), the San Joaquin Regional Rail Commission (SJRR) and the San Joaquin Joint Powers Authority (SJPA), evaluate the impact of the improvements to connecting the San Joaquin and ACE corridors in a manner that is aligned with the State Rail Plan; and
- Use of high-speed infrastructure and trains for enhanced intercity service in the Central Valley. This would allow the use of infrastructure as an enhancement to existing intercity and regional passenger services as part of the State Rail Plan and in conjunction with the investments being made in Valley Rail.

The ETO analysis found that a Merced-Fresno-Bakersfield service integrated with ACE and San Joaquins service was the only early operation that generated incremental value across all services. Additional planning and analysis is needed to further identify the optimal balance of operations, costs and revenues. However, the analysis showed incremental benefits to the state passenger rail network that generate much more ridership and greater value for

the public funding spent on operating intercity and regional rail services through the Central Valley.

The summary that follows identifies how a phased service implementation may potentially benefit the state's existing passenger rail system. The ETO Financial Plan Study (ETO Study) analyzed the impact of these options combined with existing rail and bus services in the Central Valley and San Francisco-to-Gilroy corridors. To view the ETO study visit http://hsr.ca.gov/docs/about/legislative_affairs/Central_Valley_and_Peninsula_Corridors_Operations_Financial_Plan_Study.pdf

These evaluations built off the 2018 California State Rail Plan and included operational factors, such as connectivity, ridership, passenger transfers and revenue. The analysis evaluated how interim service options could enhance, replace, augment or improve existing and proposed state rail services and improvements.

Chapter 1: Early Interim Service Analysis

Central Valley Line

The ETO Study evaluated how riders of San Joaquins service from Sacramento and Oakland to Bakersfield might benefit from access to high-speed rail assets. In addition, the ETO used information from the service expansion for both ACE and the San Joaquins to envision better connections possible among rail and bus services when operated in an integrated rail network.

Options Assessed

The ETO Study included an assessment of four basic options varying in length. The alternatives included Madera to Poplar, Madera to Bakersfield, Merced to Poplar and Merced to Bakersfield. The ETO's Study looked at operational factors, such as connectivity, ridership, passenger transfers, revenue and alignment with the 2018 State Rail Plan. When evaluated against operational factors, two of the four segments, Madera to Poplar and Merced to Poplar, were screened out prior to any detailed analysis for the reasons listed below.

Analysis of Madera as a Stop

The ETO Study analyzed the performance of Madera as a stop, measuring Madera's feasibility by the following two main components:

- Direct access and direct egress, which reflects the passengers who access the system in this particular station; and
- Seamless connectivity, which reflects the impact in the passengers who are using the station as a transfer point between connecting services. The behavior of passengers when selecting a mode of

transportation is highly sensitive to the transfer times and ease of connections.

Analysis of Poplar as a Stop

The ETO Study used the same approach to measure Poplar's feasibility and found that:

- Poplar as the southernmost station of a future high-speed rail service presents a challenge from an operations perspective;
- High-speed rail service that stops in Poplar will leave Bakersfield without any rail service;
- The catchment area for Bakersfield's station is significantly higher than Poplar's station; and
- The cost addition related to operating down to Bakersfield instead of Poplar is minimal compared to the loss of ridership resulting from the exclusion of high-speed rail service from Bakersfield.

Analysis of Remaining Segments

The ETO Study then focused on the two remaining segments, Merced to Poplar and Merced to Bakersfield. After more analysis, the ETO Study eliminated Madera and Poplar as endpoints of an initial operating segment, then removed the Merced-Poplar segment from consideration.

The ETO Study examined Merced as a stop, finding that Merced offers:

- Better cost efficiency per train mile due to a longer high-speed section;
- Best option for seamless connectivity. After analyzing the State Rail Plan, Merced offers the best location for an intermodal station between ACE, high-speed rail and the San Joaquins;

Submission 241 (Michael Claiborne, Leadership Counsel for Justice and Accountability (For Fairmead Community & Friends), June 21, 2019) - Continued

Chapter 1: Early Interim Service Analysis

- Higher ridership due to Merced's larger population making access for passengers more direct than compared to Madera; and
- The main drivers for the increase in Merced ridership compared to the scenario of Madera primarily results from reduced transfer penalties at Merced with the connecting services.

As a result, the ETO selected the Merced-Bakersfield segment as the only segment for further consideration.

Merced-Fresno-Bakersfield Study Assumptions

For comparison purposes, the ETO Study assumed the following:

- A scenario based on consultation with existing rail service providers that fully integrates ACE, the San Joaquins and high-speed rail services with the service levels currently funded through the Valley Rail Project and other state-funded projects, taking into account the capacity constraints of the private freight infrastructure being used;
- An investment to provide a connection between the San Joaquins and high-speed rail segment services at Merced, so that both ACE and the San Joaquins trains can service a combined station;
- High-speed rail service priced at fares similar to current San Joaquins services, and a regular hourly service would be offered on the high-speed rail segment; and

- The SJJPA would not operate any competitive service south of Merced.

The ETO Study included a qualitative and quantitative analysis of service, ridership forecasts and operations and maintenance cost estimates for the total corridor. Over the last several months, the Authority, working with CalSTA, has been discussing this alternative with the SJRRC and the SJJPA. The SJRRC indicated that it supports the option to coordinate services with the operator of the Central Valley high-speed rail service.

We support the Authority's recommended early interim service between Bakersfield, Fresno and Merced with stops at Kings/Tulare and Madera. Passengers will greatly benefit from slashing 90 to 100 minutes off train travel between Southern California and the Sacramento and Bay Area regions in the north. Currently, many people make these longer distance trips on the San Joaquins; a faster trip will attract even more riders. Direct connections in Merced to ACE and the San Joaquins will also translate into faster connections to the Capitols, Caltrain, BART, SacRT, Valley Link and VTA systems, which will also experience higher ridership. The success of this early interim service will re-energize the excitement and demand for the ultimate high-speed rail system.

- Stacey Mortensen,
Executive Director
San Joaquin Regional Rail Commission

The ETO Study included an analysis of ridership and farebox revenue forecasts. This analysis provided an understanding of how this improved high-speed rail service would compare to the service forecasted in 2026 without high-speed rail.

Ridership

Ridership and revenue forecasts used the State Rail Ridership model, calibrated for the ETO Study. This model better analyzed the impact to connected regional services. The Authority's existing ridership and revenue model is a planning tool designed for a more expansive network and the model is not adequate for the more detailed operations analysis of a shorter line segment. The State Rail Ridership model was calibrated based on input from the ETO, CalSTA and the SJRRC.

The model:

- Used the San Joaquin Corridor ridership and revenue data as input for calibration;
- Assumed high-speed rail from Merced to Fresno to Bakersfield as part of an integrated service with the San Joaquins, including rail stops at Madera and Kings/Tulare;
- Included the improved connections in the northern and southern Central Valley by 2026; and
- Used the existing fare policy of the San Joaquin Corridor.

The ridership forecast for an integrated service using high-speed rail assets resulted in revenues that were up to 2.8 times higher than the San Joaquins and ACE services forecasted in 2026 without high-speed rail. These projections include all estimated trips on an integrated passenger service network, including the

San Joaquins, the Altamont Corridor Express and high-speed rail services, as well as connecting bus services in Bakersfield.

The main drivers for the higher ridership included:

- A substantially improved quality of service including reduced travel times and increased service levels;
- Fares consistent with current San Joaquins service;
- Improved accessibility at a Merced intermodal station, shortening transfer times between the San Joaquins, the Altamont Corridor Express and high-speed rail services; and
- Enhanced service levels, bus connections and the number of daily trips based on use of high-speed rail infrastructure.

Farebox Revenue

The ETO Study also reviewed how much of the operations and maintenance of the system would be covered by farebox revenues and then calculated a farebox recovery ratio based on the combined farebox revenues (including ancillary revenues) over the combined costs. More specifically, the farebox-recovery ratio shows how much of the operating and maintenance costs are "covered" by the fare revenue. The farebox-recovery ratio includes high-speed rail, the Altamont Corridor Express and the San Joaquins services.

Fares from the forecasted service in 2026 without high-speed rail will cover approximately 41 percent of the current operations and maintenance costs. Incorporating high-speed rail infrastructure and trains into this network could improve that to 73 percent

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EXHIBIT 1.1: OPERATIONS AND MAINTENANCE COSTS VERSUS FARE REVENUES (IN 2018\$ MILLIONS, 2026)

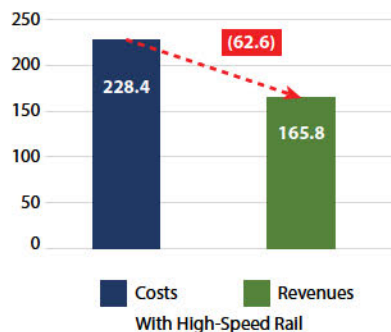
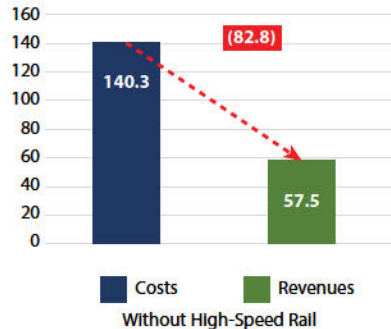


EXHIBIT 1.2: OPERATIONS AND MAINTENANCE COSTS VERSUS FARE REVENUES (IN 2018\$ MILLIONS, 2026)



by providing more frequency, faster service and the elimination of delays due to freight trains, thus attracting more people to the system. Much more service (approximately double the number of total train miles) and much greater ridership is realized on the proposed system. The revenues were evaluated in total for all services. The revenue sharing agreements have not yet been established between the operators.

According to the ETO's report, the financial scenario is better with high-speed rail than without high-speed rail, as shown in Exhibits 1.1 and 1.2. Total operating and maintenance costs with high-speed rail are 1.6 times higher than without high-speed rail in 2026. However, total revenues with high-speed rail are 2.9 times higher than without high-speed rail, resulting in a smaller gap of \$62.6 million compared to \$82.8 million.

This means that from the point of view of California's state budget, introducing early high-speed rail services in the Central Valley (Merced-Fresno-Bakersfield) is financially attractive and creates benefits for the communities in the integrated corridor because of the positive impacts shown across the San Joaquins and ACE corridors.

Chapter 1: Early Interim Service Analysis

Early Train Operator's Conclusions

The analysis concluded that improving service between Merced, Fresno and Bakersfield with a high-speed rail interim service—in coordination with improvements aligned with the State Rail Plan north of Merced to Sacramento and to the Bay Area and bus connections south of Bakersfield to Southern California—created the highest value and benefits, including:

- Provide faster, more frequent and more reliable passenger service than is currently available in this corridor, as shown in Table 1.0;
- Reduce travel times for passengers between Sacramento and the Bay Area to Bakersfield by up to 90 to 100 minutes;
- Enhance connectivity and accessibility to other passenger-rail services;
- Provide the highest ridership potential and fare revenue of any other Central Valley option, as shown in Table 1.1;
- Improve air quality in the Central Valley by shifting from diesel to clean, electrically powered trains;
- Provides an overall infrastructure configuration offering significant benefits to both passenger and freight movement; and
- Allow for early testing of high-speed operations and passenger use and reduce ramp-up time for future extensions.

Additional planning and analysis is expected to advance on this scenario to address how to best optimize this service after addressing necessary agreements with and requirements from various stakeholders and agencies.



PHOTO: INTEGRATING HIGH-SPEED RAIL WITH INTERCITY BUS, REGIONAL RAIL AND LOCAL TRANSIT WILL BENEFIT TRAVELERS.

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Chapter 1: Early Interim Service Analysis

TABLE 1.0: MERCED-FRESNO-BAKERSFIELD - BENEFITS WITH AND WITHOUT HIGH-SPEED RAIL (2018\$, IN MILLIONS)

Description	Corridor Without High-Speed Rail (ACE and San Joaquins only)	Corridor With High-Speed Rail (Includes ACE and San Joaquins)	Benefits with High-Speed Rail (Includes ACE and San Joaquins)
Train miles of service per year	990,838	1,932,225	More than double the service and more frequent service
Travel time change	—	Reduces travel time by more than 90 minutes	Higher quality service
Average operating cost per train mile	\$118.04	\$110.61	More efficient cost per mile
Percentage of costs covered by fare revenues (includes thruway bus)	41%	73%	32% improvement

TABLE 1.1: ANNUAL OPERATING COSTS AND FARE REVENUES WITH AND WITHOUT HIGH-SPEED RAIL (2018\$, IN MILLIONS)¹

	Operating Costs	Fare Revenue	Difference
Without High-Speed Rail (ACE and San Joaquins only)	\$140.3	\$57.5	(\$82.8)
With High-Speed Rail (ACE and San Joaquins)	\$228.4	\$165.8	(\$62.6)

¹ - Based on 2026 operating year assumption; analysis to be updated.

Chapter 1: Early Interim Service Analysis

San Francisco Peninsula: San Francisco–San José–Gilroy

The ETO study identified a high-speed rail service scenario for the section from the 4th & King station in San Francisco to Gilroy, evaluating the operations and maintenance costs and ridership/revenues. This included an analysis of an extended electrified high-speed line from San José to Gilroy and included a comparison to an estimated service level that the corridor could theoretically achieve, considering improvements currently under development by Caltrain.

The ETO Study concluded that most of the improvements to service in this corridor will be captured by the Caltrain Electrification Project already underway. It concluded that:

- Early high-speed rail operations, servicing only four high-speed rail stations, will have a relatively small impact on corridor ridership prior to the full connection to the Central Valley since ridership between these four stations comprises only about 12 percent of Caltrain's total ridership. Caltrain is already proposing an increase in all-day local and express service as part of its electrification program; and
- As shown in Exhibits 1.3 and 1.4, in the absence of full Silicon Valley to Central Valley service, Gilroy to San José passengers would benefit most from an integrated service that functions as an extension and expansion of Caltrain service, rather than as an overlay of high-speed rail services serving limited stops and requiring a transfer.

Additional analysis is recommended to consider the implications of interim use of this corridor in advance of the full Silicon Valley to Central Valley service.



VISUAL: STATION AREA DEVELOPMENT WILL INVOLVE LOCAL COMMUNITIES.

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EXHIBIT 1.3: ANNUAL RIDERSHIP, BASED ON ETO STUDY OF SAN FRANCISCO TO GILROY (FIGURES IN MILLIONS)

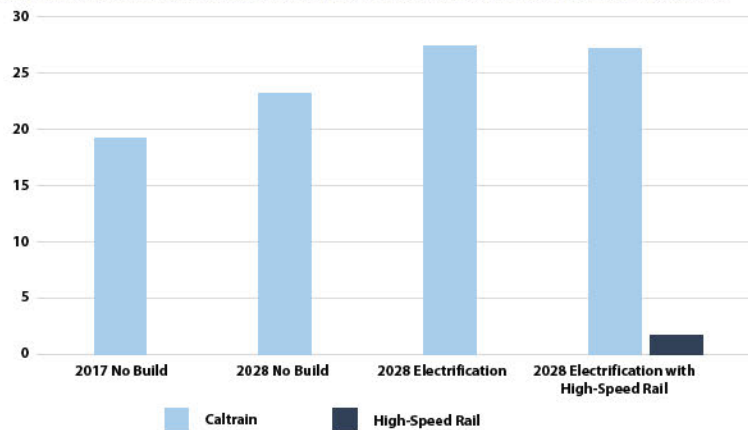
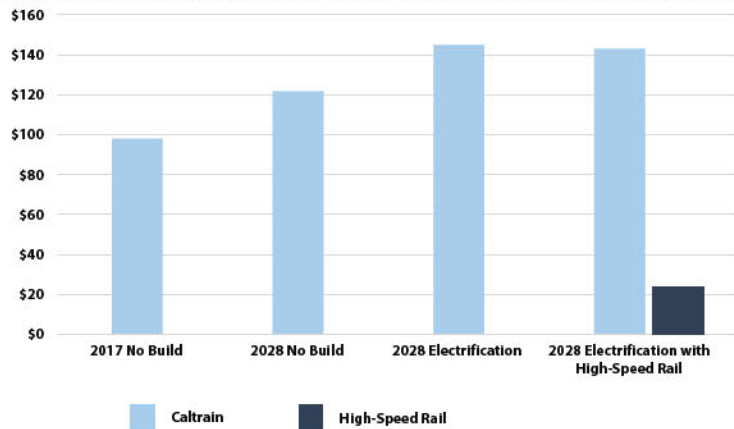


EXHIBIT 1.4: ANNUAL REVENUE, BASED ON ETO STUDY OF SAN FRANCISCO TO GILROY (FIGURES IN MILLIONS)



Chapter 1: Early Interim Service Analysis

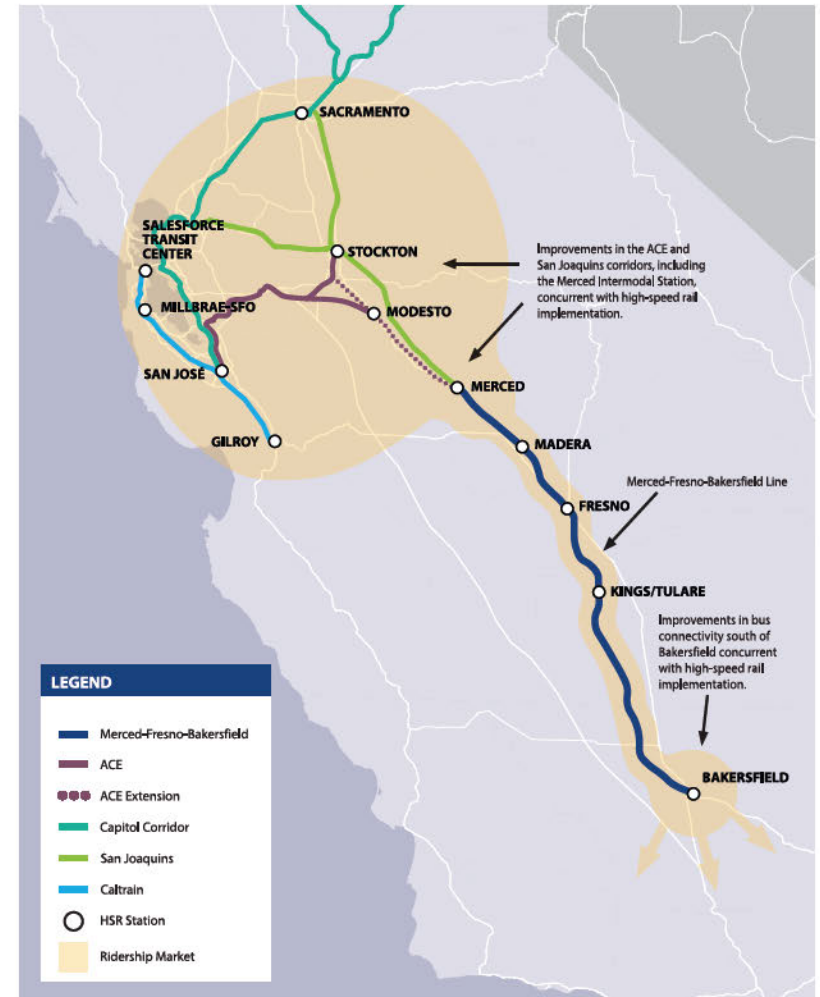


EXHIBIT 1.5: MERCED-FRESNO-BAKERSFIELD CONNECTIVITY ANALYSIS MAP

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Chapter 1: Early Interim Service Analysis

Merced-Fresno-Bakersfield Interim Service Benefits

The 171-mile trip from Merced to Bakersfield currently takes 2.5 hours by car and more than 3 hours by existing passenger rail. Implementation of high-speed intercity rail service could cut that travel time in half, as shown in **Exhibit 1.6** on page 23. The faster travel times and the improved connectivity that high-speed rail will bring to the Central Valley has the potential to fundamentally transform the regional economy.

But the first building block will also deliver other benefits, including:

- Improved reliability by operating on a dedicated passenger rail line allowing more frequent, on-time service within the Central Valley;
- Faster travel for passengers traveling between Sacramento and the Bay Area to Bakersfield by reducing trip times by 90-100 minutes;
- Better connections to the Altamont Corridor Express and San Joaquins services to the north and bus connections from Bakersfield to the south, improving access to other California destinations (as shown in **Exhibit 1.5**); and
- Replacing diesel passenger service with clean, electrified trains, which reduces CO2 emissions.

The Authority coordinates extensively with CalSTA and other regional partners on planning and implementing the overall Statewide Rail Modernization Program. The goal is to incorporate high-speed rail into a single, integrated state rail improvement strategy.

The 2018 State Rail Plan lays out a vision for statewide, integrated rail and transit service, allowing for rail to connect all urban, suburban and rural communities with frequent, reliable service by 2040. It focuses on the benefits of being able to reliably connect between systems with well-planned transfers, and to purchase and plan travel with one easy transaction, including travel that will include the high-speed rail system. Many investments are contemplated to be in place in the first 10 years (by no later than 2027), allowing for high-speed rail to connect to improved rail, express bus and transit services at all stations.

Examples most relevant to the Central Valley high-speed rail service include:

- Transit connectivity to the Altamont Corridor Express (ACE) service and San Joaquins services traveling to the Bay Area and to Sacramento in the north;
- Frequent rail services connecting Sacramento and the northern Central Valley at Merced, allowing high-quality transfers to high-speed rail service;
- Improved express bus service connecting the Central Coast and Visalia/Porterville with the Kings/Tulare station; and
- Improved express bus service between Bakersfield and Santa Clarita, connecting to more frequent rail services between Santa

Chapter 1: Early Interim Service Analysis



NEW HIGH-SPEED RAIL STATIONS WILL PROVIDE CONNECTIONS AND PASSENGER AMENITIES.

ARTIST CONCEPT

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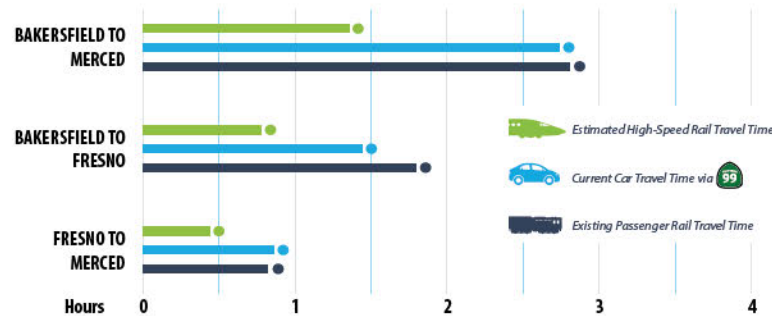
Clarita and Los Angeles, Orange County and San Diego, as well as the rest of the Metrolink system.

By planning and partnering with these agencies and projects, the Authority can further identify ways that investments may yield near-term benefits that enhance current rail and transit services and provide significant improvements and access to future high-speed rail service.

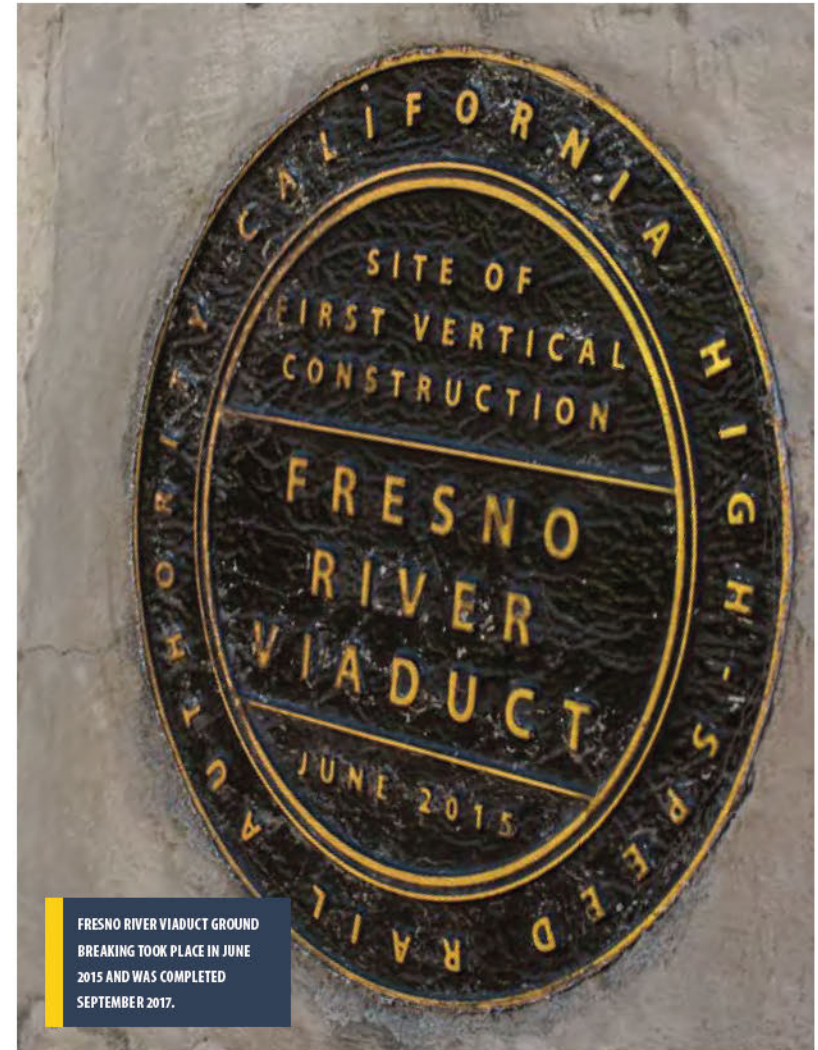
Moving forward, further coordination is necessary with CalSTA, the SJRR, the SJPA and others regarding possible integrated operations and service options. This work will require further analysis of additional infrastructure and the train equipment options that may be available for the interim service, a detailed service plan and a coordinated funding and implementation strategy to ensure successful integration of services.

For additional steps moving forward, see Chapter 4, Implementation Plan.

EXHIBIT 1.6: COMPARATIVE TRAVEL TIMES FUTURE HIGH-SPEED RAIL, EXISTING CAR, 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. Existing passenger rail travel times were approximated using the Amtrak website, referencing schedules current as of publication. Car travel times were estimated based on mid-week, peak-hour trip. High-speed rail travel times are for non-stop service.



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Chapter 2: Capital Cost Review



CHAPTER 2: CAPITAL COST REVIEW

In the 2018 Business Plan, the Chief Executive Officer directed that additional work be conducted on the capital cost estimates including a thorough review by the Early Train Operator and a comprehensive risk review. This chapter reports on the results of that work.

For the 2018 Business Plan, the Authority updated its estimates on program baseline costs and schedule for completing the 119-mile Central Valley construction project currently underway and the estimated costs and schedule for delivering the Silicon Valley to Central Valley Line and Phase 1 System. For the first time, the costs were presented in ranges based on current project status in various stages of project development. Where a project was more advanced, and costs were more certain, the estimates were presented in a narrower range. If design was less

advanced and costs were less certain, the estimates were presented in a wider range. These ranges were based on estimate classifications by AACE International (American Association of Cost Engineers) and varied depending on the complexity of the project scope elements, maturity of underlying technical baseline information and the inclusion of appropriate contingencies. The range assumed a general level of risk based upon each project's level of development which was applied as an overlay to the estimate. In addition, the 2018 Program Baseline cost estimate established initial costs for construction risks in the Central Valley known at the time.

Following the adoption of the 2018 Business Plan by the Board of Directors in May 2018 and its delivery to the Legislature, the Authority Board adopted the 2018 Program Baseline—which established the

Chapter 2: Capital Cost Review

scope, schedule, costs and budget for the Silicon Valley to Central Valley project and all Phase 1 environmental and planning documents. The 2018 Program Baseline established a structured process for evaluating and managing changes going forward.

As committed to in the 2018 Business Plan and noted above, the CEO directed additional cost estimate review and risk analysis. Specifically, this included:

- The Early Train Operator (ETO) conducted an independent benchmark exercise of capital cost elements to identify any areas where further refinement was appropriate, this included a comparative analysis of similar cost elements and a review of assumptions where variances were identified;
- An updated estimate-at-completion (EAC) of the 119-mile Central Valley Segment and Merced-Fresno-Bakersfield line;
- An expanded Monte Carlo risk analysis to determine if the range-based approach should be updated or further adjusted; and
- Work to further define risk areas and detailed mitigation strategies.

This chapter describes the work that has been completed and the results of these reviews. Further discussion of construction risks and mitigation can also be found in **Chapter 6, Program Risk**. To view the ETO report visit http://hsr.ca.gov/docs/about/legislative_affairs/Review_of_Capital_Costs_Est_2018_Assoc_with_Section_SF_Baker_Valley_To_Valley_Concept.pdf

Early Train Operator Review of Cost Estimates

The ETO completed a review of the 2018 Program Baseline Capital Costs contained in the 2018 Business Plan. The ETO's review focused on the Silicon Valley to Central Valley Line and provided a benchmarking comparison to the construction costs associated with Deutsche Bahn high-speed rail projects in Germany. The objective of the benchmarking study was to identify potential cost estimate revisions based on experience with similar high-speed rail projects.

Some cost categories—such as right-of-way acquisition, utility relocation and environmental mitigation—are location dependent and unique for each project section; therefore, these cost categories were excluded from the review. In addition, the ETO cost analysis excluded from its review other specific costs in each category related to labor rates, material availability, transportation costs, contingencies and Buy America requirements as these requirements were not comparable to European examples.

The ETO study identified improvement opportunities that could affect the budget estimation, including labor assumptions for tunnel construction, technical recommendations to be addressed in the procurement processes and other improvement opportunities to be further developed after a more detailed level of design is available.

The following seven cost elements were the most applicable and had the most significant impact on the Authority's cost estimates:

- Tunnels (21 percent);
- Viaducts and bridges (17 percent);

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- Grade separations (8 percent);
- Track (ballasted) (5 percent);
- Earthwork (4 percent);
- Retaining walls (4 percent); and
- Overhead catenary system (3 percent).

Of these, the largest cost drivers—nearly 40 percent of the costs—are major structures, including viaducts, bridges and tunnels. These elements also involve the largest labor and materials costs and contain the greatest unknowns in terms of underground conditions once in construction.

Tunnels

The ETO's benchmarking comparison indicated that the construction costs of high-speed rail tunnels in Germany were about 56 percent lower than the Authority's estimates for the Pacheco Pass tunnel. The main cost categories driving this difference are procuring tunneling equipment, mining and mucking operations, pre-cast concrete lining, and time-dependent indirect costs.

However, the Authority's construction cost estimates for the Pacheco Pass tunnel appear to be in line with the historic tunnel costs experienced on various rail transit and commuter rail projects in the United States, per the Federal Transit Administration's capital cost database. A review with the ETO led to a re-evaluation of the assumptions on the makeup of tunneling crews, and the Authority will update the Pacheco Pass tunnel construction cost estimate in the next program baseline revision as part of the 2020 Business Plan.

Most importantly, the ETO also recommended performing supplemental geotechnical investigations

and reviewing the tunnel design criteria to potentially optimize construction cost estimates by reducing overly conservative design assumptions commonly associated with the unidentified risks of underground construction.

Viaducts and Bridges

The ETO's benchmarking comparison indicated that the construction costs of high-speed rail bridge and viaduct structures in Germany were about 25 percent lower than the Authority's estimates for these structures located in the Central Valley. After further review, the ETO determined that this cost difference is primarily driven by the seismic conditions in California and in the Central Valley, which is a moderate seismicity zone. Site-specific seismic requirements were considered as a factor to adjust the values for better comparison.

Based on this analysis, the Authority will update its Design Criteria Manual to allow for innovative structure design guidance, such as the use of seismic isolation bearings, which could lead to more efficient foundation designs and, potentially, to lower construction costs.

The ETO's review also suggested more extensive use of pre-cast concrete design for viaduct structures. This approach will reduce the time required to build these structures—especially those longer than 2 miles, such as the planned viaduct structure in Bakersfield. In addition, this approach will allow the Authority to start follow-on track and systems construction activities earlier, leading to tangible reductions in the overall delivery schedule while reducing time-dependent indirect costs.

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Other Costs

The ETO noted that additional information on the track construction cost would be necessary to validate the estimated construction costs of ballasted track, as well as slab track, to confirm the cost of materials and production rates. The Authority is performing outreach to major suppliers of track materials to validate these construction costs.

In addition, the ETO's review recommended conducting a power study to validate budget allowances on traction power facilities and utility interconnections. The Authority has completed this study and will review the results with the ETO team as part of the next phase of review.

Early Train Operator's Role Going Forward

The ETO's benchmarking assessment provided the Authority several areas where our cost estimates could be further refined. The ETO recommended that, as the Authority defines designs further and more information becomes known, any deviation amounts should be put in contingency. The ETO also recommended that the Authority regularly assess both risks and opportunities and adjust contingencies as appropriate. The Authority concurs with and is implementing this recommendation; risk identification and assessment workshops have been conducted as part of the baseline revision process.

Based on the ETO's review, the Authority is taking the additional actions shown in **Exhibit 2.0 on the following page** over the next year. The Authority will provide the Legislature and the public with a further update on our cost estimates and risk analysis in the Draft 2020 Business Plan which will issued for public review in February 2020.

The ETO's continuous involvement with program-development activities, including its review of preliminary engineering, procurement and final design documents, presents a unique opportunity to optimize California's high-speed rail system to achieve high levels of reliability, availability and maintainability. This will further our goal of assuring safe and cost-effective high-speed rail operations.

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EXHIBIT 2.0: EARLY TRAIN OPERATOR RECOMMENDATIONS/AUTHORITY ACTIONS

Early Train Operator Recommendations	Authority Actions
<p>Review improvements opportunities in these Seven major cost drivers</p> <ul style="list-style-type: none"> ■ Bridges and viaducts ■ Earthwork ■ Tunnels ■ Retaining walls ■ Track ■ Grade separations ■ Overhead catenary system 	<p>Update Design Criteria Manual</p> <ul style="list-style-type: none"> ■ Reflect innovative structural design in design criteria manual (by 6/30/19) ■ Review track and system estimates to validate assumptions on material and production costs (by 12/31/19) ■ Review tunnel assumptions (by 12/31/19)
<p>Configuration matrix and technical recommendations</p> <ul style="list-style-type: none"> ■ ETO suggests reviewing the technical recommendations given in its report to prevent additional risks ■ Creation of a Baseline Configuration Traceability Matrix to track the impact of changes between the different components 	<p>Incorporate ETO as part of the verification and validation team for future project development</p> <ul style="list-style-type: none"> ■ Establish a joint technical group for verification and validation of technical assumptions ■ Establish a joint cost estimating group for verification and validation of costs ■ Adjust configuration management process
<p>Schedule, risks and opportunities register, alignment of cost components in sections</p> <ul style="list-style-type: none"> ■ Creation of a risk and opportunities register, adjustment of the contingencies for each Cost Component. ■ Update project schedule for updating the critical path. ■ Align cost components within all sections to identify missing costs 	<p>Complete Authority cost update and risk analysis and align cost structure in the sections</p> <ul style="list-style-type: none"> ■ A comparison of the sections cost structure will be conducted in order to detect cost components not being considered within specific sections (by 12/31/19) ■ Update schedule (Completed) ■ Update risk register (Completed)

Estimate at Completion and Monte Carlo Analysis

In addition to the ETO review of our cost estimates, the Authority conducted an estimate-at-completion review and a Monte Carlo risk analysis as part of its ongoing review and updates to the Central Valley Segment capital costs and schedule.

This Authority will conduct a cost-risk evaluation (CRE) annually. This annual update process allows the Authority to evaluate current requirements and associated risk which may have developed during the preceding period. These may result in reductions in risk profiles or an increase as a result of new risks being identified.

Monte Carlo simulations are an analytic technique used by transportation professionals in the public and private sectors. Monte Carlo analysis uses a statistical evaluation of known risks to predict probability of known and unknown events. The goal of a Monte Carlo simulation is to quantify the chance, or probability, that a particular risk will occur. This is to better understand the variable effect a risk might have on future costs, revenues, schedule or other aspects of a program.

The results of the Monte Carlo analysis provides decision-makers a more thorough understanding of the impacts and a level of confidence associated with a specific estimate. This drives more informed choices, strategies and plans to prevent, manage or mitigate these potential risks and for establishing project budgets, including setting appropriate contingency levels.

As noted above, the 2018 Program Baseline cost estimate used a risk overlay to establish updated cost estimates. This means that depending on the level of design a risk percentage was assigned to various categories of construction.

Risk Analysis Methodology and Recommended Confidence Level

The Authority conducted a robust risk assessment effort on the capital costs of the Central Valley Segment to identify and quantify discrete cost and schedule risks as well as the uncertainties associated with the program scope. This assessment included a thorough review of the base project scope, cost and schedule established in the 2018 Program Baseline followed by a comprehensive process to identify and quantify individual project risks relating to potential cost and schedule variables.

The risk management team then integrated risk events and uncertainties into the 2018 Program Baseline estimate and schedule to build a bottom-up risk model using a Monte Carlo simulation technique. By utilizing a Monte Carlo analysis, the range of possible outcomes, such as finish dates and cost exposure, as well as the probability or confidence level associated with each potential outcome could be determined. This technique allows the Authority to statistically quantify the cost and schedule impacts to projects being completed within budget and on schedule.

This risk-informed forecast allows the Authority to:

- Drill-down and understand the impacts of specific risks;
- Supports prioritization of risks for mitigation;

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- Implement risk management and mitigation measures; and
- Proactively monitor the program's costs.

For capital projects, contingency reserves are necessary to cover potential increased costs that may result from project unknowns and known risk events. These known and unknown risks are often associated with unexpected design complexity, incomplete understanding of stakeholder requirements, technology or market uncertainty, physical construction impacts and procurement strategy. The amount of contingency selected for any given risk can vary depending on the severity of the risk and the overall likelihood of it occurring. The Monte Carlo analysis allowed the Authority to test the variability of a number of different risks occurring to more specifically understand individual risks.

By developing these risk-informed forecasts and accounting for a potential number of unknown variables associated with implementing the additional scope identified, the Authority is now reconsidering the confidence level it has been using to establish contingency budgets. The prior Central Valley Segment budget assumed essentially a P10 (10% probability) estimate – a 10% confidence that the costs would be within that identified budget.

By going through the Monte Carlo exercise staff has identified many risks remain with current construction and new risks have been added with new scope. Given this, staff will be recommending to the Board of Directors that a new Central Valley Segment budget be set using a 70th percentile, or P-70, confidence level. By using a higher confidence level, the Authority is accounting for risks it is currently tracking and managing and for the unknown risks that

may still occur given the current status of design and construction. This is a prudent, industry best practice approach based on the current status of the project.

Along with this recommendation to increase the amount of contingency reserve, Authority staff will also be discussing with the Board the approach to managing these on-going risks and how these contingency funds will be spent.



PHOTO: CENTRAL VALLEY CONSTRUCTION WORKERS INSTALLING STEEL REBAR

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Updated Central Valley Segment Cost Estimate

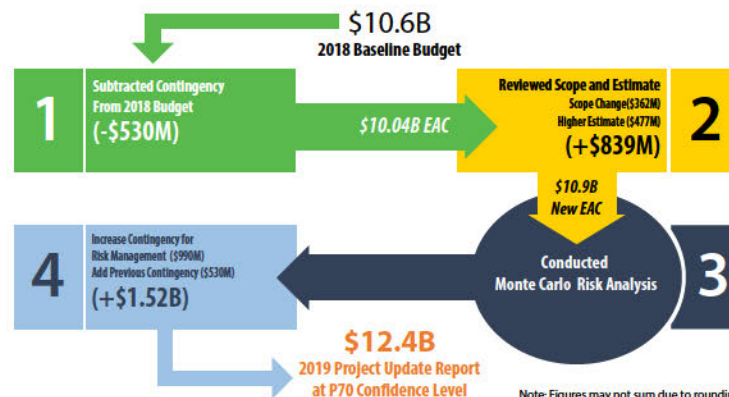
The Monte Carlo Analysis required staff to build—from the bottom up—a Central Valley Segment cost estimate. This involved assessing the current construction scope remaining and updating the Estimate at Completion (EAC), identifying new scope based on decisions and developments since the 2018 Business Plan and, lastly, conducting the Monte Carlo analysis on the current and new remaining scope. The result of updating the EACs and conducting enhanced risk analyses is a recommendation to the Board of Directors to increase the Central Valley Segment 2018 Program Baseline budget (detailed in the 2018 Business Plan and adopted by the Board of Directors) from \$10.6 billion to \$12.4 billion – roughly the high end of the cost range used in the 2018 Business Plan. Doing so involves increasing the contingency to manage risks by \$990 million, for a

new total contingency of \$1.52 billion, which reflects the recommendation to set the budget at the P-70 confidence level.

This section discusses the key drivers associated with this proposed budget increase: (1) scope changes (\$362 million) and (2) higher cost estimates (\$477 million). It also identifies using a recommended P-70 confidence level for costs assigned to potential risks based on Monte Carlo analysis (\$990 million), as shown in Exhibit 2.2.

The steps associated with developing this updated budget are shown in Exhibit 2.1 below and discussed further below. As a first step, the Authority subtracted all contingency costs associated with risk (\$530 million) from the \$10.6 billion 2018 Program Baseline budget.

EXHIBIT 2.1: CENTRAL VALLEY SEGMENT COST ESTIMATE REVIEW AND RISK ANALYSIS PROCESS



Note: Figures may not sum due to rounding.

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Scope: As part of the second step, the Authority identified scope changes subsequent to the establishment of the 2018 Program Baseline budget.

The factors driving scope change include:

- Changes in design specification for existing scope; and
- Settlement negotiations with third parties and railroad.

The net increase associated with these and scope changes is \$362 million.

Cost estimates: The second step also involved identifying areas where the 2018 Program Baseline cost estimates were either too high or too low.

Cost increases occurred due to further investigation and re-evaluation of 2018 Program Baseline estimates. Examples of cost estimate increases include changing the procurement approach for the Northern Extension, delay costs, and updated designs. The net increase

Chapter 2: Capital Cost Review

associated with these changes to the cost estimates is \$477 million.

The Authority then added the total of these increased costs—for scope and for higher cost estimates—to the stripped \$10.4 billion 2018 Program Baseline estimate resulting in a new projected Estimate at Complete (EAC) of \$10.9 billion for the Central Valley Segment.

Monte Carlo risk analysis: In the third step, the Authority conducted the Monte Carlo risk analysis. Among the risks accounted for in this analysis were additional potential cost risks associated with the three design-build construction packages and right-of-way acquisition costs. The results of this analysis are shown in Exhibit 2.3 below which shows a cost risk curve ranging from a P0 to P100. This exhibit is a common visual representation of a Monte Carlo risk assessment.

Chapter 6, Program Risk, specifically the section titled Managing Construction Risk, summarizes the major ongoing risks facing the completion of the Central Valley Segment and the extensions to Bakersfield and Merced and the mitigation strategies underway.

As discussed above, staff recommends selecting the P-70 confidence level as a prudent basis for updating the 2018 Program Baseline budget for the Central Valley Segment. This provides for additional contingency for future risks. For the final step, the Authority added the risks costs stripped out of the 2018 Program Baseline (\$530 million) with the results of the Monte Carlo analysis and the selection of the P70 confidence level (\$990 million). The sum of these two figures created \$1.52 billion in contingency for the Central Valley Segment.

The combination of scope changes, cost estimate increases, as well as the updated risk analysis would result in an updated \$12.4 billion budget for the Central Valley Segment.

EXHIBIT 2.2: CENTRAL VALLEY SEGMENT: 2018 BUDGET AND PROPOSED 2019 BUDGET

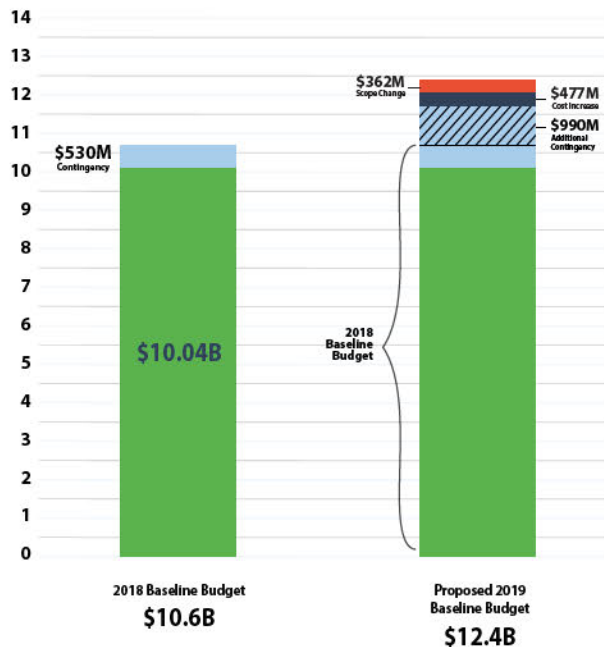
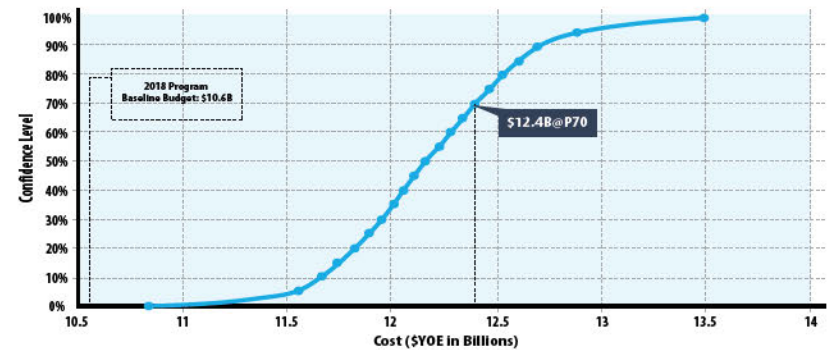


EXHIBIT 2.3: CENTRAL VALLEY COST RANGE BASED ON MONTE CARLO ANALYSIS



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Revised Central Valley Segment Cost Range

Exhibit 2.4, below, shows the comparison of the updated cost estimate range based on the Monte Carlo analysis to the range shown in the 2018 Business Plan.

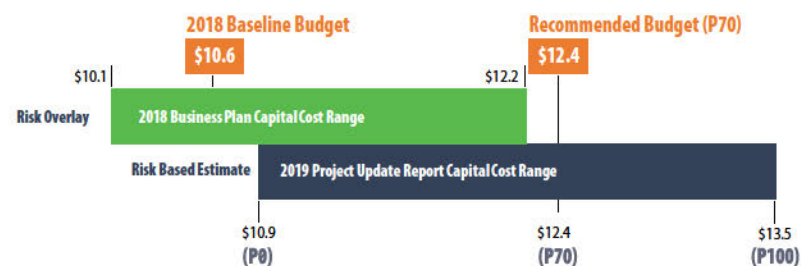
What this graphic shows is that the estimate range identified in the 2018 Business Plan is consistent with the new range established as a result of the Monte Carlo analysis. This new range reflects:

- The risks that remain to construction are many and we still have nearly four years of environmental review and construction to complete the federal scope of work by December 2022. There will be another six years after that to complete a Merced-Fresno-Bakersfield line by the end of 2028. In addition, due to current issues with the federal government, there are some risks that may be out of our control. However, for

the risks we can control, we are prepared to manage them.

- We are still in the process of working through legacy issues with our contractors and the fact of the matter is, after many years of negotiation, right of way still needs to be acquired and third-party agreements need to be resolved. We have recently been granted additional authority by the Legislature related to right of way. However, these legacy issues continue to affect construction delivery.
- The Central Valley Segment recommendation increases the amount of budget allocated to address risk based upon the updated Monte Carlo risk review. This increases the confidence in meeting this budget to a P-70 confidence level and implements an industry best practice approach towards addressing risk through contingency reserves.

EXHIBIT 2.4: CAPITAL COST RANGE COMPARISON - 2018 BUSINESS PLAN VS 2019 PROJECT UPDATE REPORT (\$YOE IN BILLIONS)



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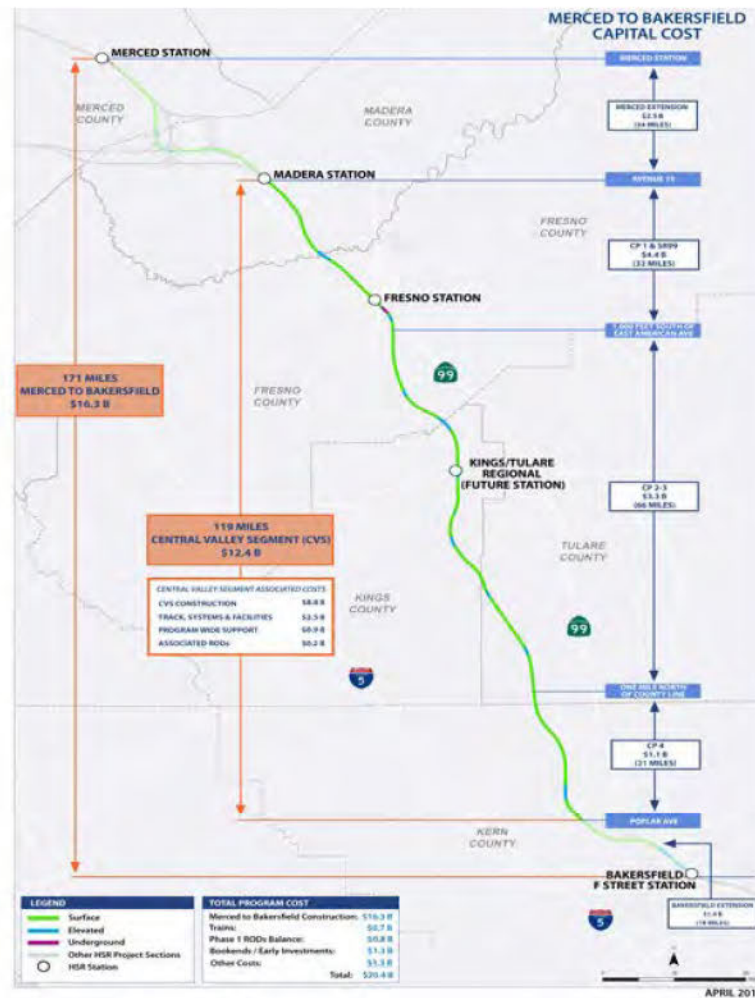


EXHIBIT 2.5: MERCED-FRESNO-BAKERSFIELD CAPITAL COST ESTIMATES (\$YOE IN BILLIONS)

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Merced-Fresno-Bakersfield Building Blocks

Exhibit 2.5 on the previous page provides the capital cost estimates to complete the Merced-Fresno-Bakersfield line and the program support costs.

Exhibit 2.6, on page 38, identifies the progression of cost estimates for the Merced-Fresno-Bakersfield line. The costs begin with committed funds for the completion of the federal scope of work and completion of a Central Valley Segment, and state and regional commitments already made.

The Authority will build on these initial commitments to complete an operational passenger test track initially from Madera to Poplar. Concurrently, we plan to build the extensions to Bakersfield and Merced for passenger operations. In Chapter 3, **Funding and Affordability**, we provide an overview of the funding available aligned with these building blocks.

Merced-Fresno-Bakersfield

The Authority also conducted a Monte Carlo Risk analysis for the Merced-Fresno-Bakersfield line. The results of that analysis, including the P70 confidence level for that line, as shown on page 38. By also using

a P70 confidence level on this longer segment, the Authority continues to use a prudent, industry best practice approach to manage risks. The Authority's ability to deliver this line within current funding capacity is discussed in Chapter 3, **Funding and Affordability**.

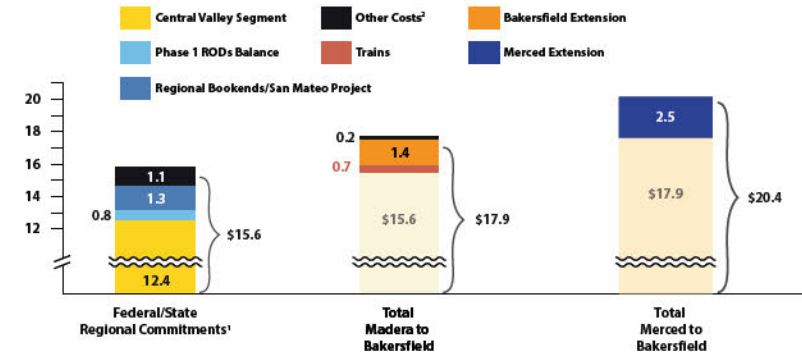
Monte Carlo Analysis Results

Exhibit 2.7, on page 38, shows the cumulative probability distribution curve for the Merced-Fresno-Bakersfield line that includes the extensions to Bakersfield and Merced, track and systems on these extensions, and the procurement of trainsets, an interim heavy maintenance facility and stations.

This S-curve provides the range of possible costs resulting from design complexity, incomplete stakeholder requirements, technology or market uncertainty, and procurement strategy and other factors. Based on the risk-informed forecast, Authority staff is recommending adoption of a budget of \$20.4 billion (\$YOE) at the 70 percent confidence level.

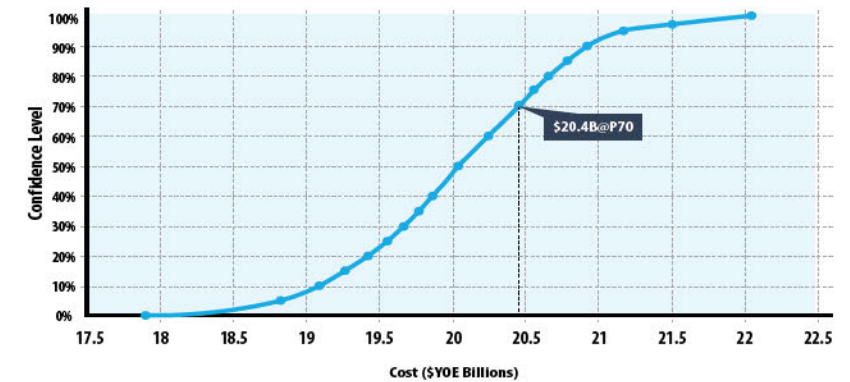
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EXHIBIT 2.6: CAPITAL COST ESTIMATE BUILDING BLOCKS



1. Federal/State/Regional Commitments – These include completion of the Federal grant agreements to complete all Phase 1 Environmental Documents and 119 miles of civil and structural rail infrastructure from Madera to Poplar; completion of state and regional projects including SB 1029 Bookend projects (Caltrain Electrification Project, Rosecrans/Marquardt Grade Separation and Link US) and the regional San Mateo Grade Crossing project.
 2. Other Costs – Other costs include program support costs and historical Phase 2 expenditures.

EXHIBIT 2.7: MERCED-FRESNO-BAKERSFIELD COST RANGE BASED ON MONTE CARLO ANALYSIS



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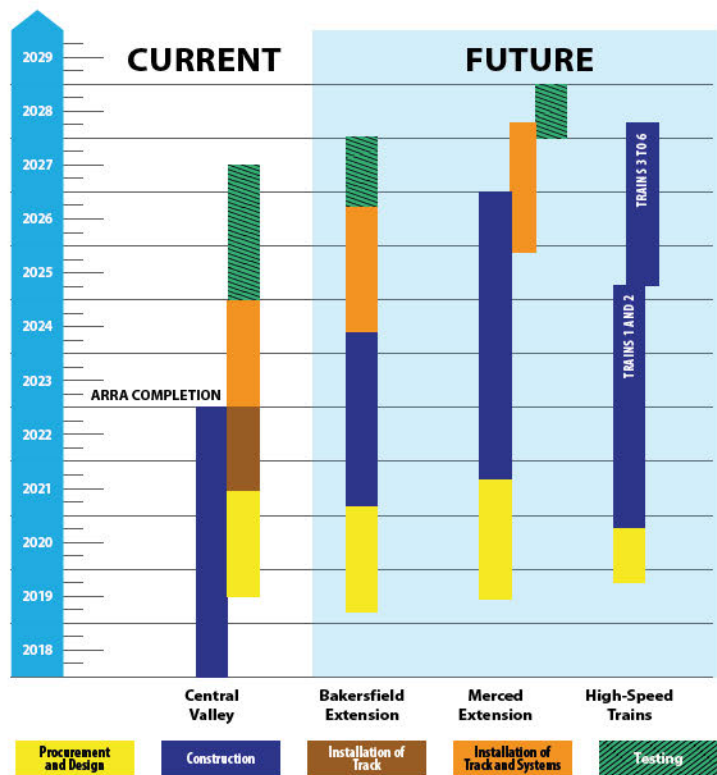
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Schedule

Exhibit 2.8 provides a general schedule for the completion of the work underway and the future work necessary to get to passenger operations. As this schedule shows, the Authority currently expects to meet completion of civil and structural construction and track installation requirements by December 2022 as required in the federal grant agreements. Future schedule time-frames depends on moving forward with future contracts in a timely manner. The Authority will continue to provide the Legislature with updates on our progress and any future developments related to federal participation.

EXHIBIT 2.8: MERCED-FRESNO-BAKERSFIELD PROJECTED TIMELINE



Managing Contingency

Infrastructure programs are complex and risky undertakings with many latent risks at the time of award – encountering different site conditions, third-party requirements and refinements, changed laws and regulations, endangered species and habitats and many others. Successful outcomes require that potential risks be identified and managed. The Authority has a comprehensive risk management approach for forecasting and assigning costs to the potential risks associated specifically with delivering the high-speed rail program. Some risks are within the Authority’s control while others are external. Some risks can be mitigated or managed to eliminate or reduce their impact on costs and schedule. Where they cannot be cost-effectively mitigated, contingency funds are used to address these emerging risks. This is considered as best practice on large infrastructure projects.

As part of project development and implementation, the Authority uses a Monte Carlo risk-informed approach to identify and quantify potential risks so that it can establish a contingency allowance. This allowance provides additional funds in the program budget to account for risk mitigation measures. More specifically, contingency funds are designated to be used to address increases in cost resulting from risks that occur after no other mitigation measure is available. For example, in the Central Valley, contingency funds were set aside to anticipate the cost risk associated with unidentified utilities that must be relocated to construct high-speed rail infrastructure. These funds were set aside at a time when the utility conflicts were not fully identified, and the actual costs were not fully known. As the design was advanced, more utility conflicts were identified

than anticipated, therefore as the risk has become “known” funds have been released to pay for these changes.

The Authority establishes and manages contingency funds from the bottoms up on each project/contract. Contract-level contingency accounts are only accessible by Authority managers in accordance with a governance regime that includes a “delegation of authority” that is also approved by the Authority’s Board. Contract-level contingency funds can be drawn down when a risk occurs, and the appropriate documentation has been produced and approved through the Authority’s governance process. For lower cost risks, the use of contingency funds may be approved by the appropriate contract manager; for risks at higher costs, approval of the use of contingency funds is elevated. The movement of contract-level contingency funds into actual contracts is controlled by the Authority’s change management process and is reported to the Board’s Finance and Audit Committee on a monthly basis. Access to program-level contingency requires approval by the Authority’s Board of Directors to establish contingency funds in a project and/or contract-level contingency account.

Because the nature of the risks associated with delivering a project can evolve, risks are re-evaluated and re-quantified on an annual basis. The allocation of contingency funds throughout the program is considered on a continual basis and more formally when the Board adopts the annual budget at which time contingency accounts may be adjusted according to the changes in the risk exposure that requires Board approval.

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Silicon Valley to Central Valley and Phase 1

In our testimony to the Legislature on the 2018 Business Plan, we were clear that delivering a commercially viable Silicon Valley to Central Valley Line and the Phase 1 system will require additional funding. This is not an unusual situation for large transportation infrastructure projects. In addition, the ETO has confirmed that the Silicon Valley to Central Valley Line will be a high-value Authority-run service. We will continue to work with the Legislature, our federal partners and the private sector to identify the additional funding and financing needed to deliver the system.

In the meantime, we are working to build out the system—with the dollars we have—through a building block approach. While the Authority delivers the first building blocks, the ongoing environmental work will lay a foundation to continue construction once funds are identified to connect a revitalized Central Valley to the Silicon Valley and ultimately Southern California. For more information on this environmental work that is underway, see detailed information listed in **Chapter 7: Regional Summaries**.

2018 Cost Ranges

The Authority updated the capital cost estimate for the Phase 1 system in the 2018 Business Plan based upon the progress of project development. As a part of that, the Authority returned to showing estimates within a cost range and where the current point estimate, or "base estimate," falls within that range. A range is a more appropriate way to show cost estimates given that costs will continue to evolve and change over the life of the program as more

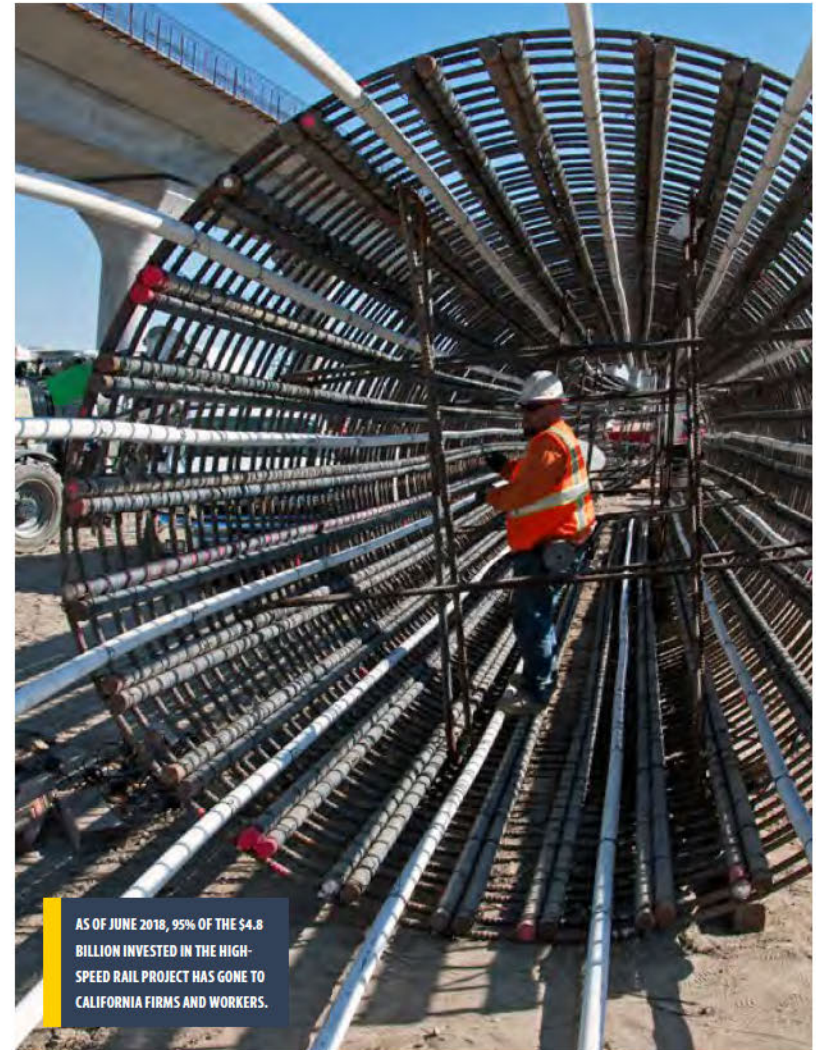
information becomes known, as program decisions are made and as construction progresses and risks are identified and/or addressed.

The Authority's 2012 Business Plan used a Phase 1 system cost range of \$68.4 billion to \$117.6 billion in year of expenditure (YOE) dollars—a range of \$49.2 billion. This range was based on our phasing plan at that time (which assumed building from the Central Valley south into the San Fernando Valley) and on the schedule assumptions used as the basis for preparing a year of expenditure estimate.

In the seven years since, the Authority has advanced environmental work on project sections and has now identified preferred alternatives for all but the two Northern California sections. Based on the updated knowledge that the Authority now has, the 2018 Business Plan narrowed the Phase 1 system cost range to a low of \$63.2 billion to a high of \$98.1 billion (YOE\$)—a range of \$34.9 billion, as shown in **Table 2.1 and Exhibit 2.9 on pages 43 and 44**.

Table 2.1 on the following page shows the revised Central Valley Segment base estimate and range that is based on the analysis conducted since the 2018 Business Plan and discussed in this report. The base estimates for both the Silicon Valley to Central Valley Line and the Phase 1 system were increased by \$1.8 billion to reflect the additional \$1.8 billion which is comprised of the (1) Central Valley Segment scope changes (\$362 million); (2) higher cost estimates (\$477 million); and (3) the recommended additional contingency for risk (\$990 million). That is the only adjustment made to the Valley to Valley and Phase 1 cost estimates.

The year of expenditure Valley to Valley and Phase 1 cost ranges have been left unchanged for two



AS OF JUNE 2018, 95% OF THE \$4.8 BILLION INVESTED IN THE HIGH-SPEED RAIL PROJECT HAS GONE TO CALIFORNIA FIRMS AND WORKERS.

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reasons. First, it would be premature to conduct a Monte Carlo analysis and seek to establish a P-70 estimate on project sections that are still relatively early in the project development and decision-making process. Second, the schedule assumptions for these year of expenditure estimates are based upon unrestricted access to funds. In other words, the cost estimates assume that funding will be available to meet civil construction demands as necessary beyond the completion of the Central Valley Segment. If funding is not available and construction is postponed, the cost estimates do not include the escalation costs associated with time.

TABLE 2.1: UPDATED PROGRAM BASE POINT ESTIMATES AND REVISED CENTRAL VALLEY SEGMENT RANGE (\$YOE IN BILLIONS)

Project Segment	Low	Base	High
Central Valley Segment*	\$10.8	\$12.4	\$13.5
Silicon Valley to Central Valley**	\$25.1	\$31.3	\$36.8
Phase 1***	\$63.2	\$79.1	\$98.1

*Costs based on information presented in this 2019 Project Update Report.
 **\$YOE based on completion date of 2029, per the 2018 Business Plan.
 ***\$YOE based on completion date of 2033, per the 2018 Business Plan.

Exhibit 2.9, on the following page, shows the previous Phase 1 2012 capital cost range (\$68 billion to \$117 billion), the current 2018 range (\$63 billion to \$98 billion) and overlays the progression of Phase 1 system point estimates since 2014 within those ranges. As this graphic shows the range of program costs have changed since 2012. That range has reduced and

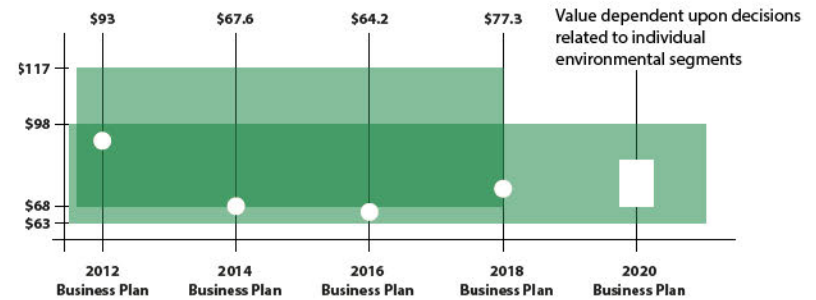
has lowered over time, although point estimates continue to vary within these ranges based upon the information known at the time.

The completion of the Silicon Valley to Central Valley line (San Francisco to Merced and Bakersfield) would follow as funding is available. The cost estimates for these future phases identified in the 2018 Business Plan have not been updated and remain within the ranges identified. Other than for the increases noted for the completion of the Central Valley Segment, these estimates remain unchanged from the 2018 Business Plan. While the Central Valley increases will affect the totals in the end, schedule impacts and the corresponding effect of inflation will also cause these number to evolve.

The established ranges are based on the information known at this time, assuming all funding is available when needed. For example, the range for the Silicon Valley to Central Valley Line is wider because design is less advanced and some decisions are yet to be made. Contrast that to the narrower range for the Central Valley Segment, where construction is underway. Again, the ranges remain the same from the 2018 Business Plan.

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EXHIBIT 2.9: EVOLUTION OF PHASE 1 SYSTEM COST ESTIMATES (\$YOE IN BILLIONS)



Cost Comparison by Segment

Legislative Requirement: This section covers statutory requirement (c) The current and projected budget, by segment or contract, for all project phase costs.

through the public review processes. The Authority Board accepted staff recommendations for preferred alternatives for southern California at the October and November 2018 Board meetings.

Legislative Requirement: This section covers statutory requirement (b) The baseline budget for all project phase costs, by segment or contract, beginning with the California High-Speed Rail Program Revised 2012 Business Plan.

Exhibits 2.10 – 2.13, on pages 46 and 47, compare the estimate progression over time for each project section and for the program’s operational elements, maintenance facilities and trainsets. The figures continue to demonstrate the theme that costs become more refined with better information.

The Authority made significant progress in furthering alignment refinements over the last year. The supplemental environmental evaluations for the Bakersfield Locally Generated Alternative and the Central Valley Wye are complete and are proceeding

It is important to be careful when making any direct year-to-year comparison. For purposes of tracking cost changes over time, costs can change based on new alignment recommendations, changed section start- and end-point assumptions, and the assignment of certain costs, such as light maintenance facilities, to project sections. In addition, coordination with

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community and regulatory stakeholders can change alignment assumptions, creating cost increases or decreases.

Finally, the estimates on the following pages have also changed based on different phasing strategies that affected how cost escalation is applied to various sections based on revised phasing strategies. For example, the 2012 and 2014 Business Plans assumed a different phasing plan than the implementation strategy today. Specifically, prior plans identified Merced to San Fernando Valley as the initial line for revenue service, but the 2016 Business Plan introduced the Silicon Valley to Central Valley Line as the initial line for service. This change in sequencing and timing affects the calculation of the year of expenditure costs.

The figures for the Merced to Fresno and Fresno to Bakersfield segments also have not been updated to include the cost estimate changes noted on the Central Valley Segment or construction of a Merced-Fresno-Bakersfield line. These cost estimates will be updated as part of the 2020 Business Plan to maintain continuity between comparison years.

The Authority updated estimates since the 2017 Project Update Report to reflect changed assumptions:

- The costs of the light-maintenance facilities were removed from the maintenance facilities category in the 2018 Business Plan and added to the applicable project sections; and
- The heavy maintenance facility category was reduced.

Other changes made in previous reports have also included:

- The 2015 Project Update Report allocated approximately \$8 billion in system wide costs across each of the project sections. These system costs included approximately \$4.4 billion for high-speed rail trains (vehicles), \$1.5 billion for program, project and construction management costs, and \$2.3 billion in unallocated contingency funds; and
- In the 2016 Business Plan, costs for high-speed rail trains and maintenance facilities were separated as independent cost categories and costs removed from individual sections. This more accurately reflects the system's operational requirements as opposed to being allocated based on an individual segment length. Program, project and construction management costs, as well as unallocated contingency, continue to be included in individual project sections.

The 2018 Capital Cost Basis of Estimate Report provides a detailed analysis of the updated construction cost estimates, how they were prepared, how the cost estimates changed and why. The report was prepared as a technical supporting document to the 2018 Business Plan. http://www.hsr.ca.gov/docs/about/business_plans/2018_Business_Plan_Basis_of_Estimate.pdf

FIGURE 2.10: CAPITAL COST ESTIMATE CHANGES BY SEGMENT SINCE 2012 (CONSTANT YEAR DOLLARS IN MILLIONS)

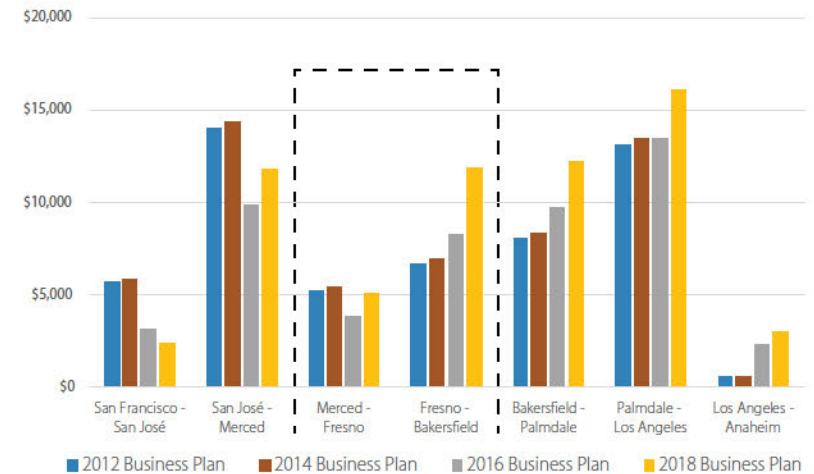
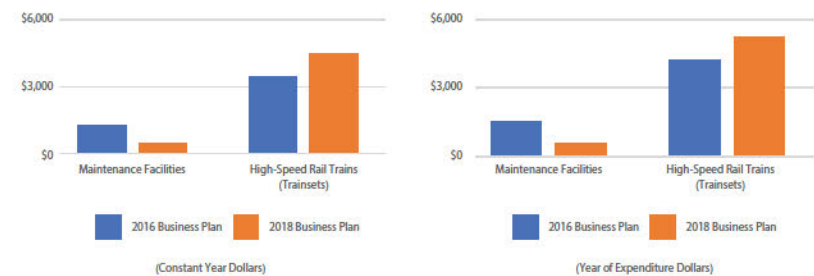


FIGURE 2.12: MAINTENANCE FACILITY AND TRAIN SET COST (IN MILLIONS)



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FIGURE 2.11: CAPITAL COST ESTIMATE CHANGES BY SEGMENT SINCE 2012 (\$YOE IN MILLIONS)

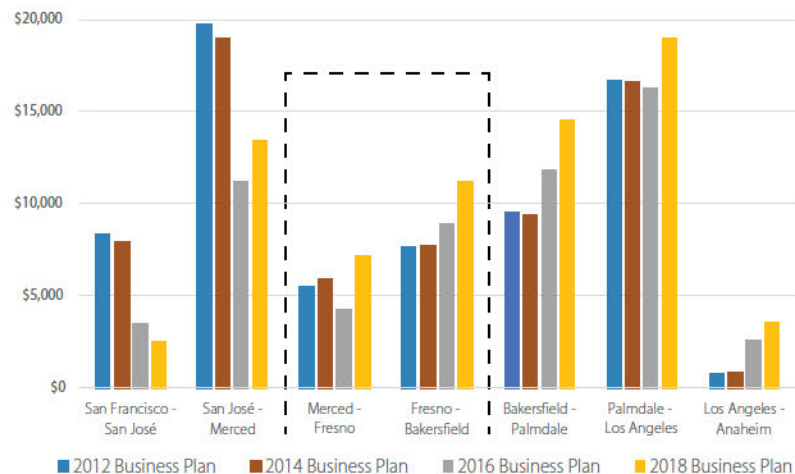
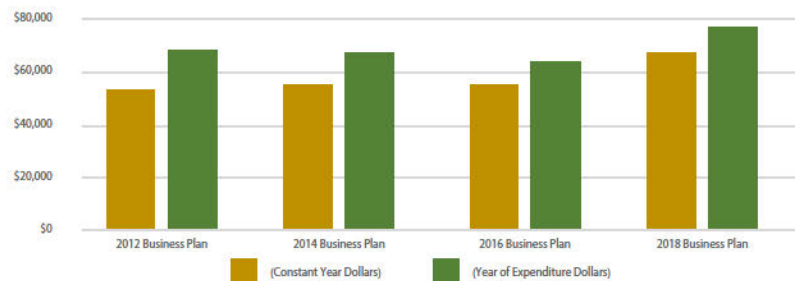


FIGURE 2.13: TOTAL PHASE 1 SYSTEM COST ESTIMATES SINCE 2012 (IN MILLIONS)



Baseline Schedule Comparison

Legislative Requirement: This section covers statutory requirement (e) The A comparison of the current and projected work schedule and the baseline schedule contained in the California High-Speed Rail Program Revised 2012 Business Plan.

The schedule comparison below shows generally how completion of the Phase 1 system has changed over time. It is important to note, that completion of Phase 1 has always been for planning purposes and based upon funding being available as construction progressed. Based on the 2018 Business Plan the projected completion of Phase 1 has extended from 2028 in the 2012 Business Plan to 2033 in the 2018 Business Plan.

In addition, over time the Authority has modified its phasing strategy for how and when it proposes to deliver the Phase 1 system. In the 2012 Business Plan, the Authority proposed delivering the Phase 1 system in three stages starting with an initial operating segment (IOS-South) linking the Central Valley to the San Fernando Valley, followed by a second step—Bay to Basin—and then the third step completing the full system. As noted below, the Authority modified this

approach in the 2016 Business Plan, switching from the IOS-South to the Central Valley to Silicon Valley Line (IOS-North). This change was made given that in 2016 it appeared that a funding and financing plan could be developed to fully fund the Valley to Valley line. For that reason, the schedules for these very different phasing plans are not comparable.

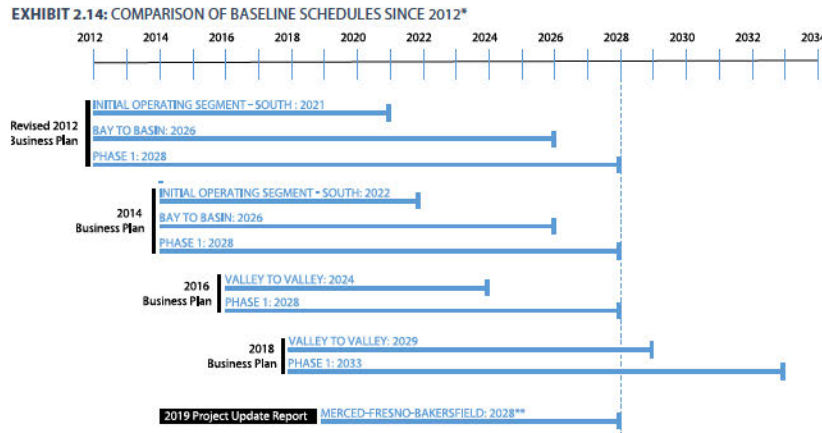
Again, as discussed earlier in this chapter, the Authority has not modified the completion dates for the Silicon Valley to Central Valley Line and Phase 1 system. Full funding for completing these lines has not yet been identified and these schedules were used as the basis for preparing year of expenditure estimates for the 2018 Business Plan.

This 2019 Project Update Report adds an early interim service milestone for comparison purposes. The 2018 Business Plan identified a goal of providing service using high-speed rail assets as soon as possible. The Merced-Fresno-Bakersfield line, recommended for implementation in this report, is shown to be completed by the end of 2028.

Exhibit 2.14 compares the baseline schedules from the Revised 2012 Business Plan to this 2019 Project Update Report.

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*Years indicate by December.

**This schedule assumes FRA re-engagement as a full partner. Because schedules for Valley to Valley and Phase 1 are largely determined by funding availability and federal re-engagement. It is premature to adjust these schedules at this time.



CONSTRUCTION CONTINUES AT KENT AVENUE AS BEAMS ARE LOWERED INTO PLACE.

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Chapter 3: Funding and Affordability



Legislative Requirement: This section covers expenditures to date, by segment or contact, for all project phase costs.

This chapter provides an overview of the funding that is currently available to the Authority and funding that is projected to be available in the future. This Project Update Report takes a slightly different tack than the 2018 Business Plan. In that plan, we estimated available revenues assuming an extension of the Cap-and-Trade Program until 2050 and additional statutory to ensure we could finance against those revenues. However, we recognize that, with the enactment of AB 398 in 2017,

the Legislature extended the Cap-and-Trade Program through 2030. Rather than seek or assume funding from another extension, we are focusing on how best to utilize the considerable funding we are projected to have over the next decade.

This chapter reflects the funding available to deliver the scope of work under the federal grant agreement and to meet our commitments to our regional partners for the bookend projects. This chapter also discusses our funding capacity, based on the best currently available estimates, to deliver an interim operating segment in the Central Valley as part of a "building block" approach to delivering California high-speed rail.

Chapter 3: Funding and Affordability

Review of Current Funding

Funding for this project has always been constrained. The fact is that we do not have all the funding in hand to construct the full 520-mile system from San Francisco to Los Angeles/Anaheim or even the Silicon Valley to Central Valley segment. Because of this, the Authority is recommending a building block approach to delivering the system that delivers the most with our available funds.

To date, the Authority has secured approximately one third of the total funding needed for the current estimated cost of the statewide system. Specifically:

- In 2009, one year after the passage of Proposition 1A, the Authority received \$2.5 billion in funds made available through the American Recovery and Reinvestment Act of 2009 (ARRA);
- One year later, in 2010, \$929 million in additional federal funding was appropriated by Congress through Fiscal Year (FY10) Transportation, Housing and Urban Development funds;
- In 2012, the California Legislature appropriated \$2.6 billion in Proposition 1A construction funding through Senate Bill 1029 to match ARRA funds and to begin construction in the Central Valley;
- In 2014 the Legislature appropriated \$650 million in one-time Cap-and-Trade funding. In addition, through Senate Bill 862, the Legislature appropriated 25 percent of the annual proceeds from the Cap-and-Trade Program to support the development and construction of the system; and

- In 2017, the Legislature extended the Cap-and-Trade Program through 2030, committing an additional \$5 to \$7.5 billion in projected revenue for advancing the project. The range reflects the fact that annual Cap-and-Trade receipts are variable (more discussion is included below). Since the extension of the Cap-and-Trade Program through the enactment of AB 398 in August 2017, Cap-and-Trade revenues have stabilized, with the Authority's share being \$1.3 billion.

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. The FRA also indicated that it was evaluating taking back the \$2.5 billion in ARRA funds that were awarded to the Authority and which has been fully expended in compliance with federal requirements and deadlines.

On March 4, 2019, the Authority sent two response letters, strongly contesting the FRA's determination that the project has failed to make steady progress. The response informed Administrator Batory 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. More discussion of this is included below, as well as in **Chapter 6, Program Risk**, of this report.

As shown in **Table 3.1**, on page 56, the Authority projects a total of between \$20.4 billion to \$23.4 billion in capital outlay funding through 2030. This chapter shows how our current funding sources combine to generate this projected total funding, how the funding can be used to fulfill our commitments and that it provides the funding capacity to deliver a Merced-Fresno-Bakersfield interim operating segment in the Central Valley.

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Chapter 3: Funding and Affordability

State Funding

To date, the Authority has secured significant funds from both state and federal sources. These funds are being used to deliver the Central Valley Segment and complete environmental planning and other early work for the entire Phase 1 System, consistent with our federal grant agreements.

Proposition 1A

In 2008, voters approved Proposition 1A, which provided \$9.95 billion for high-speed rail planning and construction and for regional connectivity projects. Of this, \$9.0 billion was allocated to the California High-Speed Rail Program, with the balance allocated to Caltrans for local high-speed rail connectivity projects. In 2012, the Legislature appropriated Proposition 1A funds through SB 1029 for the Central Valley Project, bookend projects (Northern and Southern California) and for Phase 1 environmental review costs.

In January 2017, the Authority Board of Directors adopted the Central Valley Segment Funding Plan, which estimated the cost of construction which included track and systems, stations and a heavy maintenance facility scaled to support initial operations from Madera to Poplar. This funding plan provided access to \$2.6 billion in Proposition 1A construction funds appropriated in SB 1029 for the 119-mile segment in the Central Valley that is currently under construction. As of January 31, 2019, the Authority has expended \$1.4 billion of the authorized \$2.6 billion and has put those dollars directly to work in the Central Valley.

Remaining Proposition 1A funds to be appropriated comprise \$4.1 billion for construction and \$100 million for project development. To release the balance of

the construction funding from Proposition 1A, the Authority will need to prepare a further funding plan(s) and comply fully with the requirements of Streets and Highways Code 2704.08.

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 and extended the sunset date through December 31, 2030. This was another important step by the Legislature toward securing a long-term stable source of funding for the project. Since the bill was passed, the auctions began to yield more consistent results, providing a more stable funding stream.

As of February 2019, the Authority has received \$2.6 billion in Cap-and-Trade funds, which includes the initial \$650 million appropriation and quarterly funds since August 2015. **Table 3.0**, on page 54, shows the results of the quarterly auctions to date.

Chapter 3: Funding and Affordability

TABLE 3.0: CAP-AND-TRADE QUARTERLY PROCEEDS FOR HIGH-SPEED RAIL

Cap-and-Trade Funds	Amount
One-Time Cap-and-Trade Allocation (2014)	\$650,000,000
August 2015	\$161,332,633
November 2015	\$164,194,827
February 2016	\$129,246,998
May 2016	\$2,509,168
August 2016	\$2,096,977
November 2016	\$91,077,691
February 2017	\$2,040,971
May 2017	\$127,763,161
August 2017 – AB 398 Enacted	\$140,534,316
November 2017	\$215,703,498
February 2018	\$181,650,870
May 2018	\$169,786,495
August 2018	\$169,935,376
November 2018	\$214,424,268
Sub-total (through December 2018)	\$2,422,297,249
February 2019	\$213,240,593
Total Cap-and-Trade Funding	\$2,635,537,842

Because of the variability of Cap-and-Trade auctions, the Authority established a range of future Cap-and-Trade receipts for purposes of capital planning in its 2018 Business Plan. The low range assumes that the Authority will receive \$500 million per year and the high range assumes \$750 million per year. With the Legislature's extension of the Cap-and-Trade Program through 2030, quarterly auctions have been

strong—an indication that the market has reacted positively to the legislation. As a result, the Authority's receipts have been higher and less volatile. The last four quarterly auctions have yielded \$767 million in proceeds for high-speed rail.

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Chapter 3: Funding and Affordability

Federal Funding

The Authority has received approximately \$3.5 billion in federal funding commitments to complete environmental review for the 520-mile Phase 1 system and to construct the 119-mile Central Valley Segment between Madera and Poplar.

The \$2.5 billion in ARRA funding was fully expended before the statutory deadline of September 30, 2017, and in compliance with the FRA grant requirement. In accordance with the grant agreements, the Authority is currently matching the ARRA funds with state funds, as shown in Exhibit 3.0. Per the terms of the 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 grants' scope of work. The Authority anticipates drawing down FY10 funds as soon as June 2021.

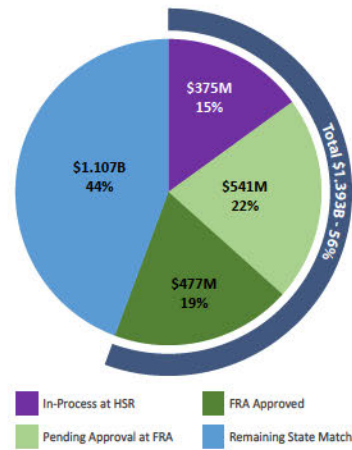
If the FRA de-obligates the \$929 million in FY10 funding, the Authority would work with the California Department of Finance and the Administration on alternative funding sources to complete the Central Valley construction work currently underway. Until the potential de-obligation of the FY10 funds by the FRA is fully resolved, these funds will be at risk. At a minimum, a unilateral federal cancellation of our grant agreement would require the Authority to re-evaluate any early service option in the Central Valley. Additionally, the FRA indicated in its February 2019 letter that it was exploring remedies to reclaim previous ARRA reimbursements and terminate the ARRA grant.

In its February 2019 letter of intent, the FRA indicated that its decision to de-obligate the FY10 funds was based, in part, on its conclusion that the Authority has failed to make "reasonable progress" in meeting its federal commitments. The Authority has challenged

this conclusion based on factual evidence of progress and believes that it has a strong case in this regard (see the Authority's response letter to the FRA in the appendices).

For this reason and for the purposes of this 2019 Project Update Report, we continue to assume that the Authority will receive the \$929 million in FY10 funds in accordance with our agreement with the federal government. And we assume that we retain the \$2.5 billion in federal ARRA funds. At the same time, we clearly recognize that these funds are at risk. If FY10 funds are ultimately not available to the program—and absent any other new funding sources—the Authority would work with the California Department of Finance and the Administration on alternatives. A discussion of how we will manage or mitigate those risks is in Chapter 6, Program Risk, of this report.

EXHIBIT 3.0: ARRA STATE-MATCH STATUS UPDATE



Chapter 3: Funding and Affordability

Summary of Projected Available Funding and Expended To-Date

Table 3.1 summarizes the total forecasted funding for the project through 2030, how much has been expended through January 2019, and the total remaining funds available. The table shows that there is a range of funding associated with 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 the completion of the statutorily required funding plans (Section 2704.08 (c) and (d), California Streets and Highways Code) demonstrating the funds are for a usable segment. Gaining access to these remaining Proposition 1A funds is also an area of risk to the Authority.

TABLE 3.1: SUMMARY OF TOTAL FUNDING AVAILABLE AND TOTAL FUNDS EXPENDED AS OF 01/31/19 (IN BILLIONS)

Funding Source	Total Authorized Funding A	Total Appropriated / Received	Total Expended to Date B	Total Remaining C = A - B
Federal Funds				
ARRA Construction	\$2.06	\$2.06	\$2.06	-
ARRA Planning	\$0.49	\$0.49	\$0.49	-
FY10	\$0.93	\$0.93	-	\$0.93
State Funds				
Proposition 1A Planning	\$0.68	\$0.58	\$0.43	\$0.25
Proposition 1A Central Valley Segment Construction	\$2.61	\$2.61	\$1.44	\$1.17
Future Proposition 1A for Silicon Valley to Central Valley Line Construction	\$4.17	-	-	\$4.17
Proposition 1A Bookends	\$1.10	\$1.10	-	\$1.10
Cap-and-Trade Received through December 2018	\$2.42	\$2.42	\$0.61	\$1.81
Subtotal	\$14.45	\$10.18	\$5.02	\$9.43
Future Cap-and-Trade*	\$6.00 - 9.00	\$6.00 - 9.00	-	\$6.00 - \$9.00
Total	\$20.45 - 23.45	\$16.18 - 19.18	\$5.02	\$15.43 - 18.43

*Future Cap-and-Trade funding assumes a low of \$500 million to a high of \$750 million per year from 2019 to 2030 (12 years). The Authority's February 2019 Cap-and-Trade quarterly auction receipt was \$213 million, and is not yet included in the total.

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Program Affordability

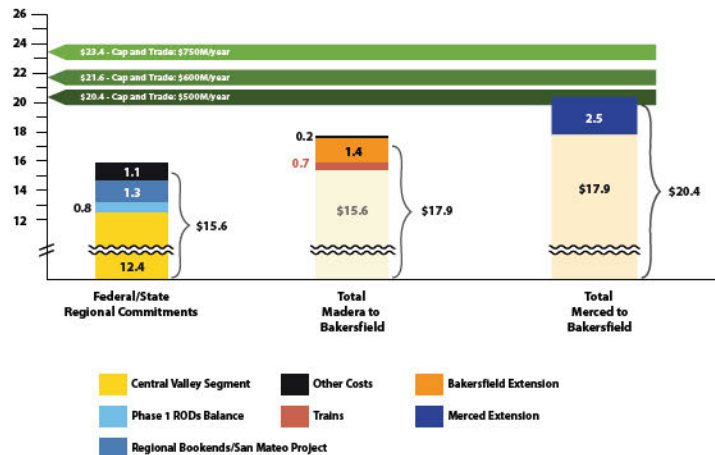
Exhibit 3.1 shows that based on current cost estimates and funding projections, there is sufficient funding to complete the federal ARRA grant scope— construction of the project between Poplar Avenue and Madera, including track, and to complete the environmental reviews for the Phase 1 system. The table also shows there is sufficient funding to both meet the federal scope and fulfill our commitments to our regional partners for the bookend projects. Further, it shows that there is sufficient funding to complete the Central Valley Segment, which adds stations, systems and a scaled maintenance facility.

In addition, we project that the Merced-Fresno-Bakersfield line is within our funding capacity. This is a snapshot of the funding projected to be available for the project and the current cost estimates at this point in time, which are dependent on the following conditions:

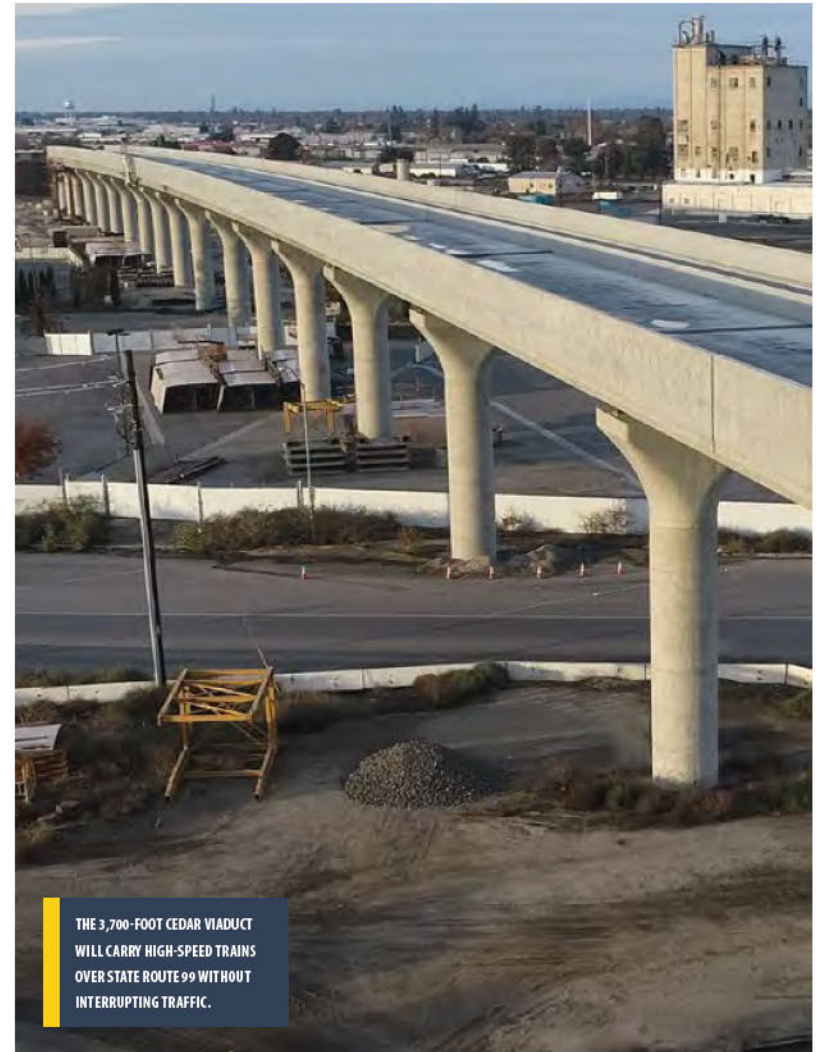
- A stable Cap-and-Trade Program through the current statutory sunset of 2030;
- The Authority retains all federal funds appropriated for the project;
- The remaining Proposition 1A bond funds are appropriated by the Legislature;
- There are no significant future increases in the current Central Valley construction costs or the cost estimates for the Merced and Bakersfield extensions; and
- The FRA re-engages with the Authority in the very near future, minimizing any higher costs that would result from delays.

Some of these risks are discussed at the end of this chapter and/or in **Chapter 6, Program Risk**.

EXHIBIT 3.1: FUNDING SOURCES COMPARED TO PROJECT COST ESTIMATES (\$YOE IN BILLIONS)



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Chapter 3: Funding and Affordability

If Cap-and-Trade funding stays at the current stable level, we can deliver the Merced-Fresno-Bakersfield line, all environmental documents and all current bookend commitments on a pay-as-you-go basis by 2028. If Cap-and-Trade revenues come in below today's stable level, the Authority will need to pursue short-term borrowing to advance funds to deliver the segment by 2028.

Funding Risks

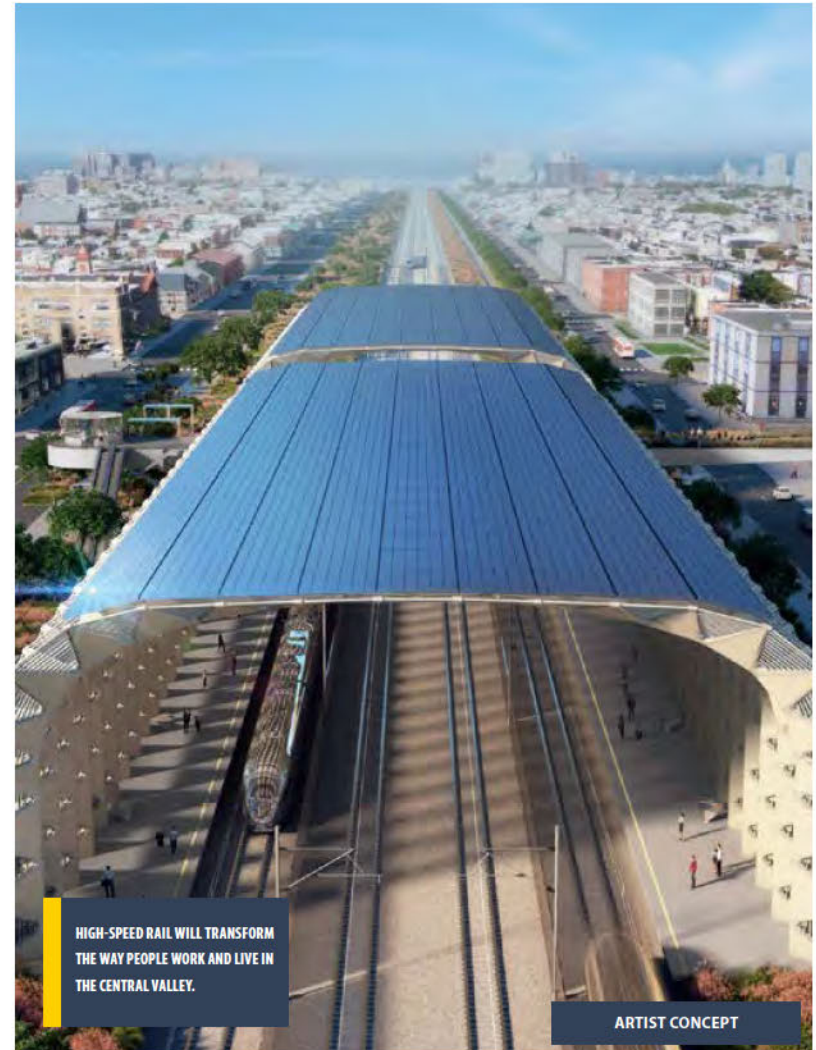
The funding section in **Chapter 6, Program Risk**, details the key risks relating to each of the funding sources. In summary, there are four primary funding risks relating to the program as follows:

- The future of federal FY10 funds remains uncertain. It is possible that the Authority will lose access to those funds, which would result in total available funding being reduced by \$929 million. If that occurs, the Authority would work with the California Department of Finance and the Administration on alternatives.
- There are currently no funds committed or appropriated for the project after 2030. Absent new state or federal legislation, this will have implications for long-term contracts that the Authority plans to procure.
- The Cap-and-Trade Program experienced a period of volatility during 2016 and 2017 that resulted in lower than expected receipts for the project. Since the passage of AB 398 in July 2017, the quarterly auctions have been more stable and robust. However, the potential for future volatility could affect the Authority's long-term planning, its ability to award contracts based on assumed future

proceeds and/or create cash flow challenges.

If Cap-and-Trade funds trend on the lower end of projections the Authority will work with the Department of Finance to advance future proceeds into 2028, or earlier, to meet cash flow needs.

- The remaining \$4.2 billion in Proposition 1A funds have not yet been appropriated by the Legislature. To facilitate the appropriation, funding plans must be prepared and demonstrate that the requirements of Proposition 1A have been met. There remains a risk that these funds may be delayed. This could have schedule and cost implications for the project.



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Chapter 4: Implementation Plan



CHAPTER 4: IMPLEMENTATION PLAN

Since the adoption of the 2018 Business Plan by the Authority's Board of Directors in May 2018, we have focused on advancing the work we laid out for ourselves in that plan:

- First, our Early Train Operator (ETO), DB Engineering and Consulting USA, reviewed our capital cost estimates;
- Second, we updated the Estimates at Completion of individual projects and conducted a Monte Carlo risk analysis of our Central Valley cost estimates to determine whether our range-based approach should be further updated; and

- Third, the ETO analyzed potential early interim service options both in the Central Valley and in the Caltrain corridor in the Bay Area. The results of this work are discussed in **Chapter 1: Early Interim Service Analysis**, **Chapter 2: Capital Cost Review**, and **Chapter 3: Funding and Affordability**.

Based on this, we have updated Central Valley cost estimates that have increased our confidence in the program estimates considerably (mainly by increasing the contingency for known and unknown risks by 200 percent). The ETO also recommended that a Merced-Fresno-Bakersfield line, as part of an integrated state network connected to the San Joaquins and ACE

Chapter 4: Implementation Plan

services, is the highest performing Central Valley alternative for interim service.

Further, the ETO concluded that most of the early benefits of interim service in the Caltrain corridor between San Francisco and Gilroy will be captured by the Caltrain Electrification Project that is underway and that we are helping fund. Therefore, the ETO does not recommend an early high-speed rail service section from the 4th & King Station in San Francisco to Gilroy. Operating in parallel to the Caltrain service only competes with a well-established commuter rail corridor that will be substantially improved by Caltrain by 2022. Therefore, the ETO does not recommend that the Authority operate high-speed service until completing the connection to the Central Valley.

Based on this work, the Authority is making a series of recommendations to be discussed with the Authority Board of Directors over the next year. This chapter outlines some of those recommendations and the actions that will be necessary to move the program forward.

Policy Recommendation: Merced-Fresno- Bakersfield

Based on this, we are making a policy recommendation to pursue a Merced-Fresno-Bakersfield interim operating segment to provide high-speed rail service to Californians at the earliest possible time and in a manner that leverages the maximum degree of connectivity to other improving rail services, while important project development work also continues in other parts of the state.

Specifically, this project development work includes the environmental clearance for all San Francisco to Anaheim project segments by 2022 and targeted bookend investments in the Bay Area and Los Angeles. Completing this project development work is an important prerequisite to further refine our designs and cost estimates and to pursuing additional funding to connect a revitalized Central Valley with the Bay Area and Southern California.

This policy recommendation is not a Central Valley line *instead* of the Silicon Valley to Central Valley Line (Valley to Valley), it is a Central Valley line *first*—as we work toward completing the Silicon Valley to Central Valley Line and then connecting Bakersfield to Los Angeles. We propose to proceed in a building block approach for delivering the full high-speed rail system as funding becomes available. This approach also leverages the improvements being made by the Valley Rail Project and other related capital investments (totaling over \$1.3 billion), which will bring much better service to the northern Central Valley on both ACE and the San Joaquins services.

At least 10 trains per day, across both services, will connect Merced to Sacramento, the Tri-Valley, the East Bay and San José, with a significant increase in the number of direct trains. In the south, much shorter bus connections from Bakersfield, where the San Joaquins service currently terminates, are being planned to allow for Southern California train transfers to occur close to Santa Clarita, rather than requiring a bus ride all the way to and from downtown Los Angeles. These improvements are critical to growing ridership and revenue on the integrated passenger rail system.

This is a realistic and pragmatic approach for using the considerable revenues available for this program

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between now and 2030, to fulfill not only our federal commitment but also our commitments to our regional partners. It is an approach designed to put our high-speed rail assets to work in a meaningful way and with independent utility. This will demonstrate the benefits of high-speed rail service at the earliest possible time while seeking additional funding to expand the system to San Francisco and to Los Angeles/Anaheim.

We make this recommendation mindful of available funding, federal requirements and the risks associated with our future relationship with our federal partner, the FRA. This approach is wholly consistent with the objectives for an early interim service required by the FRA. Plans for interim service were submitted to the FRA in 2013 and 2016. The 2016 plan—First Construction Package Utilization Plan and Concept of Operations Update—was developed in the event that the full Silicon Valley to Central Valley service was delayed due to funding constraints. These plans focused on how to provide interim operations over the 119 miles of high-speed rail infrastructure that the federal government is helping fund between Madera and Wasco/Poplar.

Our recommendation is to expand the 119-mile segment selected by the FRA in 2010 (the length of the segment was 2.5 miles shorter in 2010 but was changed in 2016 to 119 miles via a grant amendment) to a 171-mile line extending north to Merced and south to Bakersfield which will improve connectivity and maximize interim ridership. On April 22, 2019, the Secretary of CalSTA, Brian Annis, sent a letter to the Authority and the FRA supporting this expanded approach to interim operations; it is included in the appendix to this report. All agencies associated with this effort will work closely with the City of Merced to determine the optimal station location to maximize connectivity.

Current Services in the Central Valley

Today, the Central Valley is served by the San Joaquins and ACE rail systems. The San Joaquins service operates from Sacramento to Bakersfield and from Oakland to Bakersfield with a network of buses connecting the rail service to destinations throughout the state (as far north as Redding and McKinleyville, east to Reno, South Lake Tahoe, Yosemite and Las Vegas, and south to destinations throughout southern and coastal California). Approximately two-thirds of all San Joaquins riders utilize at least one connecting bus.

The San Joaquins corridor is managed by the San Joaquin Joint Powers Authority (SJJPA), which contracts with Amtrak to operate the service. The rail equipment is mostly owned by the State of California—Caltrans Division of Rail and Mass Transportation. Because the fares collected for the service do not cover the full cost of operations and maintenance, Caltrans subsidizes the difference, not unlike most public transportation systems. The San Joaquins service operates on privately-owned freight rail corridors owned by UPRR and BNSF.

The ACE commuter rail service connects the northern Central Valley to the Bay Area. ACE does not currently connect directly to Merced. However, ACE is partnering with the SJJPA to invest in Valley Rail, which will extend services to several new stations between Merced and Sacramento, allowing many more markets to have direct access to both Merced and the Bay Area.

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What We Propose

The overall operational concept evaluated by the ETO and recommended by Authority staff is regional intercity service linking Merced-Fresno-Bakersfield where service operating on high-speed rail assets integrates with existing regional rail service at Merced and bus connections at Bakersfield. This approach allows more frequent and reliable service, shorter travel times, higher ridership and a higher percentage of operating and maintenance costs to be covered by fares. Several assumptions underlie this concept, including cross-platform connections between San Joaquins and high-speed rail trains at Merced and an enhanced connection to ACE services at Merced.

Next Steps in Developing an Implementation Plan

The Authority now needs to move forward with the next phase of planning and decision-making for an operational system. We are poised to advance work on a detailed Merced-Fresno-Bakersfield interim service implementation plan. This plan will be developed at the direction of—and with oversight by—the Authority's Board of Directors, by the California State Transportation Agency (CalSTA), and the California Transportation Commission. It will be developed in close coordination with the SJJPA, ACE and our Central Valley partners, including the local cities and counties along the corridor.

There are many steps and decisions to be made along the way toward implementing this line. These include our first and highest priority—completing the federal scope of work to construct high-speed rail infrastructure on the 119-mile segment between

Madera and Poplar. It also includes completing the environmental review for the extension south to Bakersfield and the Central Valley Wye project, which is the junction point north of Madera for trains traveling north to Merced and, in the future, west to the Bay Area.

Additional work is necessary to more fully evaluate the full range of technical requirements of implementing the Merced-Fresno-Bakersfield line. Further refinements to the capital and operating costs, ridership and revenue estimates must be completed, and the commercial, legal and contractual requirements associated with its implementation need to be developed and addressed. Our planning to date envisions phasing procurements with an eye toward delivering this initial interim service while also planning for system expansion to deliver the Silicon Valley to Central Valley line.

As the Merced-Fresno-Bakersfield plan is developed and advanced, Authority staff will review issues and options with the Board of Directors and identify key decisions that need to be made over the next year. We will provide updates to the Legislature and a major update on our progress and key issues will be included in the Draft 2020 Business Plan, which is slated to be released for public comment in February 2020.

Below is a summary of the key issues to be addressed and major decisions to be made in implementing early service between Merced, Fresno and Bakersfield.

Operations Planning

The ETO will coordinate the additional analysis needed to develop a more detailed operations plan, including how it would connect and integrate

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with other passenger rail systems, beyond the initial analysis that it completed to evaluate the interim service options.

The operations plan will include memorandums of understanding, agreements and contracts with the SJJPA, ACE and our Central Valley partners—including the cities of Merced, Madera, Fresno and Bakersfield, and Merced, Fresno and Kern counties—necessary to implement operations. All operations planning and implementation documents will comply with all applicable federal and state laws and regulations.

One of the components that impacts ridership is the number and quality of the connections between services along with the ease of planning and buying integrated trips by passengers. The concept presented here assumes a highly integrated service from Sacramento, Oakland and San José in the Bay area, in Merced and seamless bus transfers south of Bakersfield to Southern California. The work moving forward will include the following steps:

- Continue to develop the integrated service concept and plan working with the San Joaquins and ACE service providers to optimize the connections and maximize the services for passengers traveling between Sacramento, Oakland and San José in the Bay area;
- Design a highly synchronized integrated service timetable for a seamless journey;
- Optimize and integrate ticketing and fare policy for a combined corridor;
- Coordinate with CalSTA, ACE and the San Joaquins to prioritize the additional improvements and infrastructure required north of Merced and development of a joint station at Merced; and

- Evaluate further opportunities to optimize bus connections.

This analysis will also provide the basis for updating the estimated operating costs for operating the interim service between Merced-Fresno-Bakersfield.

Refined Ridership/Revenue Forecasts

A more detailed and specific ridership model will be developed to further evaluate this integrated service network to review ridership and revenue forecasts based on the more detailed service concept. Until this new model has been developed, the existing State model will continue to be used.

Refined Scope, Cost and Schedule Estimates

After the service concept is created and the infrastructure and ridership forecasts are refined, the Authority will further refine the scope and capital investment requirements and schedule. In addition, the investments and improvements in the connecting ACE and San Joaquins services will need to be aligned with the Authority's project delivery schedule and be closely coordinated with CalSTA and our local partners.

Refined Funding and Cash Flow Analysis

As design work is advancing and schedule is refined, we will continue to update our cash flow analysis to match our funding sources with the program uses. Funding is regularly updated to incorporate the latest results from the quarterly Cap-and-Trade auctions.

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The Authority will continue to monitor Cap-and-Trade quarterly proceeds against expected trends to allow the implementation of our building blocks approach and advance necessary procurements for the program.

Develop Our Procurement Strategy

The procurement strategy will include developing procurement and contract documents for track and systems, additional civil construction for the extensions to Merced and to Bakersfield, and for the trainsets needed to operate interim service. These procurement and contract documents will comply with all applicable federal and state laws and regulations.

Track and Systems

To meet our federal ARRA requirements, the most immediate priority is to begin procurement of a track and system contract for the line between Madera and Poplar. This is a long-lead, high-priority procurement. Flexibility will be incorporated into this procurement to allow contractors to deliver certain elements in a phased manner that ensures seamless integration as the high-speed rail system is expanded. The track and systems contract will utilize a performance-based model that brings together the best service-proven international high-speed rail experience for application in the United States. This approach will minimize risk and maximize bidding competition.

High-speed Trainsets

Because trainsets are also a very long-lead procurement, this will also be an early and high priority procurement decision for the Authority. As with track and systems, this contract will also utilize

a performance-based model to bring together the best service-proven international high-speed rail experience for application in the United States. It will also incorporate flexibility to allow delivery in a phased manner to ensure seamless integration as the system is expanded.

Operations and Maintenance Facilities

Closely related to the trainsets is the siting of the operations and maintenance facilities that will be required to achieve interim operations. The operational control center and the maintenance of way facility will be incorporated in the track and systems procurement. The heavy maintenance facility will be incorporated in the rolling-stock procurement documents.

Civil Construction

The Authority continues to advance the supplemental environmental reviews for the extension to Bakersfield and for the Central Valley Wye. These environmental documents are pending final public reviews and federal approvals. The Authority has encountered delays in completing these NEPA documents because of the FRA's current disengagement from the project and delay in approving the Authority's request for NEPA Assignment, pending since June 2018. While continuing to seek re-engagement of the FRA to complete NEPA reviews, the Authority has begun coordination work to obtain necessary third-party and environmental permits and approvals.

The Authority will continue advancing the design to refine the full scope of work necessary to complete the civil infrastructure extending the line from Poplar to Bakersfield in the south and from Madera to Merced in the north. The Authority will develop Preliminary Engineering for Procurement documents, which will include improved survey data, value-

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engineering, geotechnical investigations, and full utility relocation design sufficient to secure necessary agreements with utilities.

With the advanced design and utility agreements in place, the right-of-way requirements can be defined. This approach will address previous lessons learned by the Authority to better define the right of way necessary prior to initiating construction. Also, it will reduce, and potentially eliminate, some of the challenges faced by the Authority with the current Central Valley construction projects, lessons which were discussed in the 2018 Business Plan.

As part of developing the procurement plan for these civil construction contracts, the Authority is assessing all the lessons learned during the execution of our first three design-build contracts and applying them to

develop the procurement and delivery model for the additional civil works required to deliver the Merced-Fresno-Bakersfield line.

Stations

Terminal and/or intermodal stations not only provide access to the system for people living near the station or nearby communities, they also serve as important hubs to provide seamless transfers and connections to other systems. The Authority will continue to work with our partners and stakeholders for planning the stations along the line to ensure access and connectivity is optimized as part of interim operations.



PHOTO: AVENUE 11 GRADE SEPARATION PROJECT WILL CARRY TRAFFIC OVER BNSF TRACKS AND FUTURE HIGH-SPEED RAIL LINES.

Chapter 4: Implementation Plan

Table 4.0 below shows key implementation milestones associated with the delivery of the Merced-Fresno-Bakersfield line by segment.

TABLE 4.0: MERCED-FRESNO-BAKERSFIELD MILESTONES

Key Date	Madera to Poplar	Extension to Bakersfield	Extension to Merced
2022	<ul style="list-style-type: none"> Federal grant commitments complete 	<ul style="list-style-type: none"> Civil construction underway 	<ul style="list-style-type: none"> Civil construction underway
2025	<ul style="list-style-type: none"> Remaining systems installed and tested Rolling stock prototype begins dynamic testing 	<ul style="list-style-type: none"> Track and systems installation underway 	<ul style="list-style-type: none"> Civil construction continues
2026	<ul style="list-style-type: none"> Rolling stock production units delivered Certification testing begins Driver and crew training on actual equipment begins 	<ul style="list-style-type: none"> Track and systems installation continues Static testing begins 	<ul style="list-style-type: none"> Track and systems installation underway
2027	<ul style="list-style-type: none"> Certification complete for rolling stock, track and systems Incorporated into Madera to Bakersfield section Driver and crew training continues 	<ul style="list-style-type: none"> Track and systems installation and testing complete for this section Rolling stock running from Madera to Bakersfield Operations and maintenance crews demonstrate proficiency 	<ul style="list-style-type: none"> Track and systems installation continues
2028	<ul style="list-style-type: none"> Incorporated into Merced to Bakersfield section 	<ul style="list-style-type: none"> Incorporated into Merced to Bakersfield section 	<ul style="list-style-type: none"> Track and systems installation and testing complete for this section Rolling stock running from Merced to Bakersfield Operations and maintenance crews demonstrate proficiency Operating Certificate received from FRA. Merced to Bakersfield segment ready for service

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Identify and Address Legal, Contractual, Budget and Other Issues

The operations plan will include memorandums of understanding, agreements and contracts that include provisions to ensure maintenance and capital replacement payments.

A legal review of all applicable federal and state laws and regulations to implement the interim Central Valley operations will be completed. Additional legal authority necessary, if any, will be considered and addressed as part of the planning process. All operations planning and implementation documents will comply with all applicable federal and state laws and regulations.

Additional work will be necessary to begin to develop these agreements, including:

- Identifying options for contracting for the interim service operations and maintenance provider which will need to consider how this interim service transitions to the larger, commercially viable Silicon Valley to Central Valley system;
- Potential revenue sharing strategies among the rail providers; and
- Agreements between the state transit agencies, ACE, the San Joaquins and CalSTA.

The Authority is advancing implementation planning for interim service in the Central Valley in close coordination with the Early Train Operator which brings significant experience in putting high-speed rail into service in Germany. It will be conducted in full partnership with our state, regional and federal partners and stakeholders. The Authority's Board of

Directors will be fully informed as this work advances so that it can make key policy and procurement decisions with full information about the options and implications of those decisions.

Proposition 1A Compliance

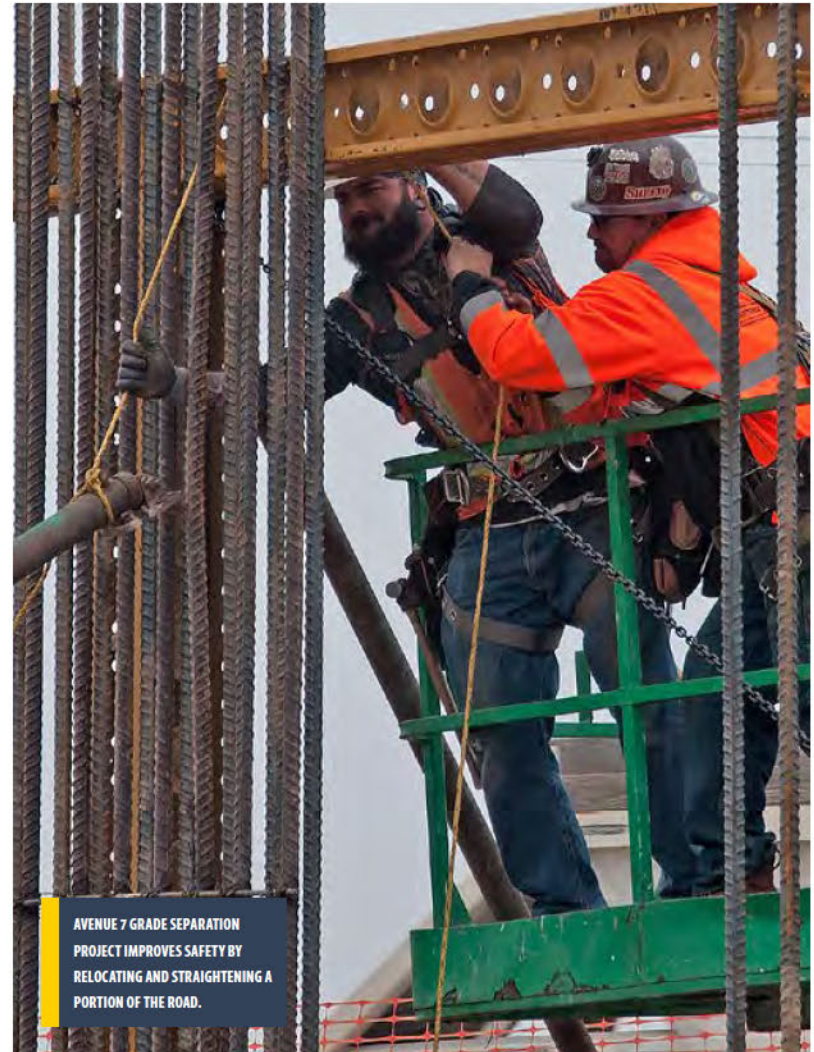
The Authority has secured funding from both state and federal sources which are all currently being used to deliver the Central Valley segment. These sources are described in **Chapter 3, Funding and Affordability**.

In December 2016, the Authority designated the Central Valley as a usable segment and approved a Proposition 1A Central Valley Funding Plan (pursuant to Streets and Highways Codes section 2704.08(d) (final funding plan)). In March 2017 the Department of Finance Director completed his review of the funding plan and approved the expenditure of \$2.5 billion in Proposition 1A funds for construction in the Central Valley and to meet match fund commitments in the Federal Railroad Administration ARRA grant agreement.

The Central Valley Funding Plan included all necessary high-speed rail components to be able to test and run high-speed rail trains over the Central Valley segment. The funding plan stated that high-speed rail trains were not part of completing the Usable Segment but will be part of the Authority's implementation and operation of a non-subsidized Valley to Valley Line.

The 2016 Central Valley funding plan stated that Authority-purchased high-speed trains would utilize this Central Valley Usable Segment as a test track to enable the rolling stock, signaling system, and the electrification system to be tested and commissioned and for all of those systems to be certified.

The 2016 Central Valley funding plan states: "Once the high-speed rail infrastructure is completed and if



AVENUE 7 GRADE SEPARATION PROJECT IMPROVES SAFETY BY RELOCATING AND STRAIGHTENING A PORTION OF THE ROAD.

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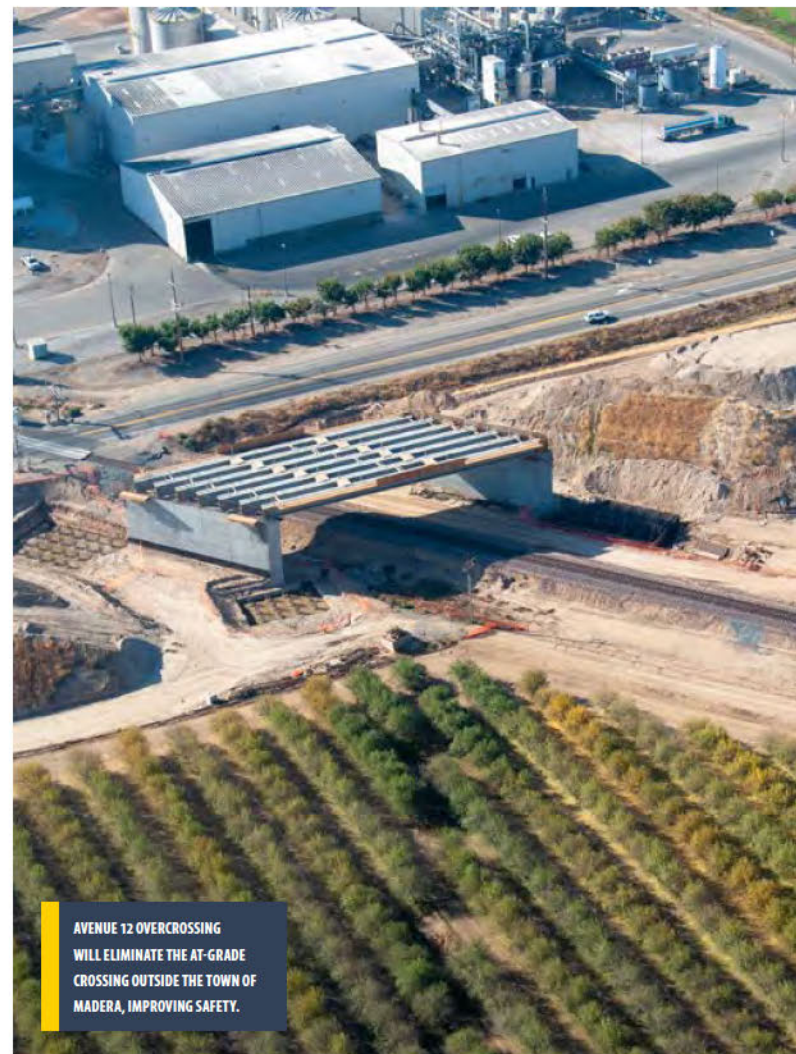
Chapter 4: Implementation Plan

it is available for an extended period of time beyond testing of high-speed trains, the Authority will explore options for how best to put the infrastructure into service. One such option would be to transfer the San Joaquins service from the existing BNSF line to run on that new infrastructure. The newly built line would allow for faster speeds, decreasing the end to end run time by as much as 45 minutes. Faster service would improve the attractiveness of the service, increasing both ridership and operating revenue. The additional revenue that this could generate would reduce the amount of needed operating subsidy by Caltrans.”

More recently, the ETO study of early interim service concluded that electric high-speed rail service is superior to running diesel San Joaquins trains in the corridor (see Chapter 1, Early Interim Service Analysis, for more detail about the ETO study). The Authority has worked with CalSTA and the SJPA to explore a high-speed rail service option. Specifically, whether a high-speed operator, other than the Authority, could operate on the Central Valley line in partnership with CalSTA and the SJPA and use—through a lease arrangement—the Authority’s electrified Central Valley infrastructure, including high-speed train sets, once testing is completed.

Access to additional Proposition 1A bond funds, above the \$2.5 billion, for capital purposes will be necessary to complete the Central Valley line from Merced to Bakersfield. Civil infrastructure from Madera to Merced and from Poplar Avenue to Bakersfield will need to be constructed. The Authority will also need to complete the installation of all the systems and electrification on the Central Valley Line as well. These additional capital costs will need to be funded with state funds only—Proposition 1A funds and Cap-and-Trade funds.

The Authority will comply with all statutory requirements in the Proposition 1A bond act to access additional bond proceeds.



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Chapter 5: Program Issues

Chapter 5: Program Issues



CHAPTER 5: PROGRAM ISSUES

Legislative Requirement: This chapter covers statutory requirement (g) Any issues identified during the prior two-year period and actions taken to address those issues.

Our 2018 Business Plan offered a candid assessment of the challenges the high-speed rail program faces. In brief, those challenges relate primarily to managing costs, schedule, securing additional funding and our transition to a fully mature project delivery organization. It is worth noting that projects around the world of similar magnitude and complexity have faced these same challenges, and successfully addressed them.

The 2018 Business Plan outlined our strategy to anticipate and manage the challenges we face, and specifically, our strategy to apply the lessons learned from our construction contract experience in the Central Valley. Since the release of the 2018 Business Plan, we redoubled our efforts to constantly improve our performance, and we are making progress. We also welcomed the recommendations offered by the California State Auditor in a review of the high-speed rail program, which was released in November 2018.

Federal Disengagement

The most significant schedule risk facing the Authority today is the Federal Railroad Administration's (FRA) withdrawal in completing its responsibilities under the National Environmental Policy Act (NEPA). Since July 2018, the FRA has not acted as required to complete the combined state and federal reviews on environmental deliverables identified in the ARRA agreement. This includes failure to complete necessary document reviews under NEPA and related federal environmental laws and agreements, not participating in coordination meetings with other federal agencies, and refusing to sign draft Environmental Impact Statements (EIS) for public circulation, despite having participated in the development and early reviews of the documents.

The NEPA reviews of two critical project sections EISs have been indefinitely delayed because of the FRA's inaction: the Merced to Fresno Central Valley Wye (CVY) and the Fresno to Bakersfield Locally Generated Alternative (LGA). These two project sections require completion of NEPA to satisfy not only the ARRA grant but also to secure necessary permits from other federal partners to enable construction. Unfortunately, the FRA's confirmed inaction compromises the Authority's ability to advance the project adding risk and jeopardizing the completion of the ARRA commitments before the December 2022 deadline. Further, this inaction will likely jeopardize the ability to advance construction of the Madera to Merced extension as well as the Poplar Street to Bakersfield Station to meet the schedule for service.

Further, the FRA's non-participation in the NEPA process for the Los Angeles County Metropolitan Transportation Authority's (LA Metro) Link US Project will result in the indefinite delay of the NEPA Record of Decision (ROD). As a workaround, LA Metro is also

progressing a CEQA-first strategy, like the Authority, to obtain the Notice of Decision (NOD) to keep the project on schedule. The Link US project is identified as part of the region's overall plans to manage traffic during the 2028 Olympic games. Despite LA Metro's effort to mitigate the risk of delay noted above, the FRA's lack of participation is likely to have a material impact on LA Metro's ability to complete the project in time for the 2028 Olympics.

Up until February 2019, FRA staff continued to communicate with Authority staff. The FRA's Engineering, Planning and Safety staff continued to participate in reviews and meetings with the Authority. However, the FRA's environmental staff would not provide direction, participate in meetings, review documents nor act on critical decisions. These inactions have affected documentation progress in nearly all project sections.

In February 2019, the FRA's limited participation with the Authority transitioned to complete disengagement as communicated through a letter from the FRA Administrator. This now obstructs the Authority's ability to advance the program and meet the mutual intent of the federal grant agreements. (See Authority's response letters in the Appendices.)

The grant agreements are cooperative agreements that requires certain actions by both parties to complete the necessary deliverables. Deliverables include the preparation of environmental impact statements and other related environmental documents. Currently, the FRA is the lead federal agency and responsible for completing NEPA and related federal environmental processes.

Since May 2017, the Authority has sought transfer of NEPA responsibilities to the Authority under the Surface Transportation Project Delivery Program,

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Chapter 5: Program Issues

known as NEPA Assignment. This program is widely recognized as a common-sense, bipartisan solution to reduce layers of review by assigning responsibility to the states where transportation decisions are made. Without NEPA Assignment or the FRA resuming its federal oversight responsibilities, the Authority cannot complete NEPA environmental reviews.

In addition, it is necessary for the FRA and the Surface Transportation Board (STB) to certify operational technical compliance. If the FRA and the STB cannot complete their certifications, this will delay any operations.

This disengagement by the FRA represents an unprecedented federal government action to cripple the advancement of a project it has helped fund. On March 4, 2019, Authority CEO, Brian Kelly, sent two letters to the FRA seeking re-engagement and the restoration of a functional partnership on this project. Those letters have been unanswered by the FRA after nearly two months.

The 2018 State Audit recommended that the Authority develop a contingency plan if at any time the ARRA grant requirements could not be achieved. It will not be possible for the Authority to develop or finalize a contingency plan without proactive engagement by the FRA.

Supplemental and Phase 1 Environmental Clearances

The grant agreements require the FRA and the Authority to complete the remaining two supplemental and six additional Environmental Impact Statements (EIS) by December 2022. Refusal to act on the two supplemental documents, the CVY and the LGA, are resulting in day-for-day delays until the FRA re-engages. Continued delay will jeopardize

the Authority's ability to complete the other six project sections environmental reviews on schedule. If the FRA has not engaged by May 2019, the Authority will incur additional delays in completing a Merced-Fresno-Bakersfield operating section, as well as incur additional cost increases, delaying the start of operations within the Central Valley.

Currently, the Authority plans to complete joint NEPA/CEQA environmental documents for all project sections. However, to advance the program during FRA absence, when a project section Administrative Draft is complete, the Authority will decide whether to proceed with a CEQA-first strategy for that section. Completion of a CEQA document will allow the Authority to better define the project, and advance construction planning, design and cost estimation. Although the schedule for completing the Final Environmental Impact Report (EIR) pursuant to CEQA will be within the Authority's control, completion of NEPA will be indefinitely delayed until the FRA re-engages as required under NEPA or transfers responsibilities under NEPA Assignment.

It is important to note these schedules and associated costs are significantly at risk. Depending on when FRA re-engages and under what condition – authorizing NEPA Assignment or retaining their federal oversight role – will affect the ultimate document completion dates and costs. The longer FRA is absent, the harder it becomes to meet the December 2022 ARRA grant agreement deadline. In addition, documents that may be completed and sit idle pending federal determination could require additional updating before publication. All projections assume that resources to complete reviews on multiple project sections are available when FRA re-engages and that work currently underway without federal involvement will not be revisited.

Chapter 5: Program Issues

Mitigation

A significant mitigation to schedule concerns will be for the Authority to be granted NEPA Assignment. However, until that decision is made, to partially mitigate FRA delay impacts, the Authority will consider implementing a CEQA-first strategy for environmental reviews. Typically, this is an approach used by states due to delays in the federal review processes, not when the federal partner stands down. This strategy enables the Authority to proceed with obtaining state environmental decisions that will allow the Authority to start critical enabling works required prior to procurement of future civil contracts. This early work includes:

- Advancing preliminary design to support execution of third-party agreements;
- Performing preliminary surveys and appraisals to support future right-of-way acquisitions;
- Securing agreements with major utilities;
- Obtaining final permits from state permitting agencies; and
- Support negotiation of terms and mitigation strategies with federal permitting agencies.

Advancing this CEQA-first strategy will result in a sequential, as opposed to concurrent, environmental review processes. The process of splitting the environmental review will add cost and complexity to each affected project section. Additional costs associated with this approach include stakeholder engagement, public circulation requirements, and increased program and project management costs resulting from the extended and duplicate public reviews. However, it will enable the Authority to

make important advances in project planning and development. It is the only viable strategy left to the Authority given the FRA's current non-participatory stance.

Other Affected Environmental Actions and Clearances

To continue to advance existing construction requires the Authority and FRA agree to project changes that have occurred on the previous environmentally approved segments. The Authority conducts a thorough environmental review of any proposed project change either initiated by the Authority or the contractor and obtains concurrence from FRA with respect to NEPA. Without FRA participation, or NEPA Assignment, the Authority lacks standing to assert that previous findings on completed environmental documents remain valid.

Mitigation

Currently the Authority is proceeding on work that the FRA has previously determined required simply documentation. However, all re-examinations requiring FRA review and concurrence are pending an FRA NEPA Assignment determination or re-engagement. A prolonged delay will require the Authority to determine how to address any change that could require significant environmental re-examination.

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Chapter 5: Program Issues

State Audit and Our Response

On November 15, 2018, the California State Auditor (Auditor) issued a report on the efficiency and efficacy of the policies and practices employed by the Authority (Report 2018-108). The audit was conducted at the request of the Joint Legislative Audit Committee (JLAC). In testimony before the JLAC in January 2018, the Authority welcomed the oversight offered by the audit as part of our commitment to ongoing improvement and transparency. Our staff cooperated fully with the Auditor's office in its review of the program and took the Auditor's recommendations seriously. The Authority has worked closely with the Auditor's office to implement the recommendations and will continue to do so.

The audit's broad objectives were to review contract management and cost containment; approval of contract change orders; efforts to determine the economic impact of the project; small and disadvantaged business contracting; sustainability and our compliance with the policy; and opportunities to expedite the project and reduce costs through cooperation with other entities.

Among the topics the audit report addressed were:

- The Authority's decision to advance Central Valley construction before completing certain planning tasks;
- The effect of the decision to pursue blended options in the Bay Area and Los Angeles;
- Our contract-management policies and procedures and documented adherence to them;

- Our sustainability policy and our measurement of compliance with that policy;
- The Authority's small and disadvantaged business goals and the extent to which it is meeting them; and
- Estimation of the project's economic impact and the extent to which its analysis follows industry standards.

The Authority has made progress on addressing these issues and others outlined below.

Organizational Refinements

Over the last year, the Authority's leadership identified, and the State Audit findings confirmed, that additional organizational work is necessary to fully execute the transition to a delivery organization. The reorganization and governance processes developed over the last year, and described further below, have been established and are in place; staff are executing work within that new structure; and decisions are moving forward. However, specific work is still necessary to ensure that policies and procedures are current, contract and state staff are properly aligned to functions, staff understand their responsibilities in adhering to those policies and procedures, and that training reinforces staff roles and responsibilities.

In addition, recruitment presents another area of challenge. As noted during the Audit review, hiring senior staff with the experience working on large infrastructure projects has been challenging. In addition, recruitment in general on a project that experiences significant public and political controversy is not always easy. Additional work

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is required to ensure that the right resources are available at the right time to achieve success.

The Auditors identified several areas where they believe we can improve how we do business. Many of the recommendations were consistent with and built on steps identified by the Authority's new executive leadership in 2018. The Authority is implementing all of the Auditor's recommendations and began reporting to the Auditor, the Legislature and the public in January 2019.

Development of Project Controls, New Governance Structure

As discussed in the 2018 Business Plan, the Authority has built on changes that were made to its governance structure and oversight functions. The Authority formalized the new organizational structure in the Program Management Plan (PMP) in October 2018. The PMP presents a governance structure and processes that stress program management and delivery.

These governance changes established a more formal assessment of the construction, financial, legal and other program perspectives related to all proposed changes to ensure fully informed decision making. Specifically, the Authority restructured and formalized the approvals and reporting conducted through the Program Delivery Committee (PDC) and the Business Oversight Committee (BOC). The Program Management and Oversight Branch manages the discussions and actions of the committees, ensuring internal decision-making rigor, accountability and transparency for major decisions. These committees, along with the Administrative Committee, report directly to the Executive Committee, which is the Authority's senior management governance committee.

These changes enhanced interdepartmental interaction through a more streamlined process for identifying issues, resolving problems and making decisions. This process ensures that issues and proposed changes are fully vetted and that decisions requiring Board of Directors consideration are well defined and clearly articulated.

Administrative Committee

The Administrative Committee provides governance and oversight of the Authority's annual Administrative Budget. Additionally, the Administrative Committee is responsible for overseeing the administration of the Authority including, but not limited to, IT, communications, human resources, procurement and contracting, employee engagement, facilities outside of Program Delivery, and commercial/business oversight.

Program Delivery Committee

The Program Delivery Committee (PDC) provides governance and oversight of the Authority's programmatic execution and performance. It is a management committee that is accountable for all aspects of program delivery and evaluates potential program changes in accordance with the 2018 Program Baseline adopted by the Board of Directors in July 2018, which established the program's scope, schedule and budget. This committee monitors program and project trends and evaluates potential changes, opportunities and risks to the 2018 Program Baseline.

Business Oversight Committee

The Business Oversight Committee (BOC) provides programmatic acquisition strategy, procurement, governance and commercial oversight. This committee acts as the change control committee and reviews change orders above the CEO's delegated

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authority prior to them being presented to the Executive Committee and, when appropriate, to the Board of Directors for approval. The BOC also reviews program delivery procurement requests prior to approving procurement actions. The BOC functions under an approved charter that outlines the committee's purpose and decision-making authority.

Documentation and Business Cases

The Authority also strengthened the business case documentation process used by these committees. Under this procedure, business cases are prepared to request a proposed change to the 2018 Program Baseline scope, schedule or cost—this includes design-build contract changes orders above the CEO's delegated authority. Each business case must provide a summary and justification of the recommended actions/changes and must be reviewed and approved by the relevant functional, legal, construction and program teams.

The Auditor had also recommended that additional documentation for actions related to construction change orders include the relevant Project Construction Management (PCM) firm's recommendation and cost estimate with an explanation of the final decision. The Authority amended the BOC's charter to also include this recommendation.

Addressing Program Management Issues

The most significant change since the 2017 Project Update Report has been the Authority's organizational evolution. We previously identified the need for staffing and organizational change to meet the significant oversight responsibilities of a multibillion-dollar program of multiple megaprojects.

New Executive Leadership Team Brings Expertise, Focus on Improvement

An experienced executive management team of highly qualified professionals started in February 2018, charged with transforming the Authority into a robust program-delivery organization:

- The Authority's Board of Directors appointed a new Chief Executive Officer (CEO) with the experience and expertise to provide leadership for the program's delivery and commercialization phase;
- A Chief Operating Officer (COO) was also appointed to oversee the construction and engineering elements of the high-speed rail program to ensure that they are delivered to quality standards, budget and schedule throughout the program's duration;
- A new Chief Deputy Director was appointed to bring a focus on transparency, contract oversight, accountability and performance. This position advises the CEO on programmatic and administrative issues and oversees the Authority's internal and personnel operations; and
- A new Chief Program Officer joined the program in mid-2017, bringing international high-speed rail construction and program management expertise. This position serves as the Deputy Chief Operating Officer. This new, integrated COO function was created to be responsible and accountable for managing all aspects of the Authority's program management and project development and delivery.



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The leadership team completed a comprehensive program management assessment to identify, realign and define staff roles and responsibilities and implemented more integrated and rigorous governance and oversight processes. These changes are now in place.

The work done on this resulted in changes to Authority business processes and organizational structure to define itself as a project delivery organization. These changes were articulated in an updated Program Management Plan, implemented in fall 2018, which established clear roles and responsibilities, created direct and efficient processes and clearly aligned headquarters and field resources. This instilled a proactive project-management approach that emphasized stewardship, organizational agility, collaboration and a collective focus oriented toward achievement, transparency and accountability.

The changes have helped focus the organization on construction progress, which is the single largest area of cost and ongoing risk management.

Creating a New Contract Management Office

As part of organizational changes made last fall, the Authority created a new Contract Management Office within the Office of Program Delivery. This change was made to bolster oversight of the Authority's larger and more complicated contracts, including its construction, PCM and Program Management Rail Delivery Partner contracts. The new Contract Management Office falls under the COO's direct supervision, and contract management remains under the purview of state personnel. This ensures direct oversight by the COO on all aspects of the delivery of the program baseline.

Organizational Evolution to Address Risk Management

One specific area focused on how to minimize risk occurrence and maximize opportunities to offset possible future program budgetary impacts. The change established a risk management team within the new Program Management and Oversight Branch. This Branch is responsible for all aspects of project and program management and oversight. This strengthens the Authority's program oversight with a focus on early trend identification, prudent risk-mitigation identification, accelerated commercial decision making and enhanced contract oversight.

The goal is to reduce individual project costs and mitigate risk, which has included:

- Developing long-range strategies and goals;
- Formulating project scope, budget, schedule and risk registers;
- Narrowing unknowns by methodically and perpetually addressing areas of challenge;
- Executing a deliberate schedule and budget;
- Eliminating risk, and actively managing and mitigating risks that remain;
- Ensuring on-time, on-budget and on-quality/safety accountability; and
- Fulfilling our community and other agency agreements.

This organizational approach, proactive project management and strategic planning will build upon risk management and mitigation strategies. The Authority's objective is to ensure that decision-making concentrates on total cost benefit and transparency.

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But, more importantly, this approach defines clear program objectives and goals, and resolves and eliminates program unknowns as project elements are advanced.

The completion of the Monte Carlo evaluations has updated program contingency and risk-mitigation plans. This supports the organizational ethic of aggressive risk minimization initiated in strategic planning and comprehensively carried through construction and rail operations, resulting in a refinement of the program cost-to-complete, summarized in **Chapter 2, Capital Cost Review**.

Improved Reporting Capability

The Authority has made many improvements to the current reporting process for program, delivery and functional reports and dashboards. This work, which was launched in late 2018, will help us as we provide quarterly program updates to the Legislature to enable policymakers and the public to track progress toward meeting the federal grant (ARRA) deadline of December 2022.

January Report to the Auditor

The first 60-day report back to the Auditor noted several areas that the Authority had implemented changes based on the Audit recommendations.

Adding Experienced Contract Managers

To bolster its ability to manage the multiple contracts associated with delivering the program, the Authority is creating a formal process for hiring experienced contract managers. This process will include emphasizing contract-management experience/

skills and desirable contract-manager qualifications. In addition, all new advertised positions that include contract management activities will specify the skills required for a contract manager within the duty statement.

All existing contract management duty statements have been reviewed and modified to reflect contract management/oversight responsibilities for all contract managers and their supervisors. Contract-manager supervisors' duty statements will also address their responsibility to hold staff accountable for compliance with the Authority's policies and procedures.

The Authority will ensure that contract-manager supervisors attend contract-management training through a separate program designed specifically for supervisors. This will ensure that they are equipped to manage and guide contract managers in adhering to the Authority's policies and procedures.

Monitoring Contract Managers' Compliance

The Authority created a schedule to perform assessments of contract manager compliance and performance, which began in November 2018. The assessments provide documented evidence that state contract managers are properly approving deliverables/invoices, resolving disputes or performance issues effectively, and justifying contract amendments with verifiable documentation in accordance with the Authority's policies and procedures. The Authority anticipates that assessments for all active contracts will be completed by May 2019. The assessments also provide supervisors/management with documentation that demonstrates contract manager accountability (conformance/nonconformance with the Authority's contract compliance procedures).

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These assessments follow a formal process requiring and reviewing evidence from contract managers demonstrating their approval of deliverable, detection and resolution of any contractor’s performance issues, and assessment of contract amendments. Any corrective actions are tracked by the quality team and reported to executive management.

The Authority has temporarily transferred internal state personnel to augment the Contract Management Branch. In the interim, any assessments performed by contract staff will be reviewed and approved by state staff. The first annual report of completed contract manager assessments will be prepared in November 2019.

Updated Policies and Procedures

The Authority’s Administration Office is in the process of evaluating and drafting updated policies and procedures. New procedures have been drafted for evaluating whether new or existing administrative duties should be assigned to contractors or to state employees, based on Government Code 19130.

Specifically, a policy and procedure to provide consistent guidance to contract managers has been drafted. In addition, staff has drafted an enhanced performance-based evaluation dashboard for the PCM firms and is updating the PCM Contract Management Manual to clarify PCM roles and responsibilities. Once these documents are finalized, updates will be incorporated into existing contract performance monitoring and reporting policies and procedures and included as part of the Authority contract managers’ monthly invoice approvals.

Quarterly ARRA Status Report to the Legislature

The Authority submitted its first quarterly status report to the Legislature in January 2019 summarizing the status of construction in the Central Valley and all environmental approvals. The report described the progress of the Central Valley construction projects using an earned value model that compares construction progress to the projected total completion cost and date. The report also provides information on project cost and schedule risk and the Authority’s response to those risks through mitigation strategies.

With the release of the first quarterly status report, the Authority received valuable feedback from legislative staff and the State Auditor. In turn, using this feedback and working collaboratively with the Peer Review Group, the Authority has developed a refined and improved report template for future use. This new template contains clear and digestible dashboards illustrating the budget (including cost risks), schedule and spending rate for each of the construction packages.

The Authority is committed to producing a quarterly status report that achieves the legislative purpose – to enable policymakers and the public to track our progress and in meeting the federal grant deadline. To that end, the Authority is conferring with legislative staff and the State Auditor on the format of the new report template and its use moving forward. The next quarterly report will be released July 1, 2019 and each quarter thereafter.

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Increased Transparency

The Authority is committed to transparency and accountability. We understand the importance of keeping the public informed about the work we are doing to deliver high-speed rail and how we are conducting this work on behalf of the citizens of California.

Recently, Governor Gavin Newsom directed us to take steps to provide an even greater degree of transparency for the citizens of California. Our Board of Directors fully supports his request and we are taking the first steps to fulfill that commitment by creating a Transparency and Accountability webpage. Our goal is to provide the public with easy access to key documents including those that are most current.

The Transparency and Accountability webpage includes change orders executed to date for the Authority’s three Central Valley design-build construction contracts:

- Construction Package 1;
- Construction Package 2-3; and
- Construction Package 4.

What Is a Change Order?

Change orders are common to most projects and very common on larger projects. A change order is a revision to a current contract that modifies the scope of work to or from the contract and may alter the original contract amount and/or completion date.

Future Funding

The challenges of funding a transportation system of this complexity and magnitude are not new to this program or to other large-scale transportation infrastructure programs across the country and around the world. One of the biggest challenges we face is securing full funding for delivering the system. That is why we are taking a “building block” approach to funding and delivering the program.

Since the inception of planning for the program, it has been assumed that the system would be funded with federal, state and local funds—and with private investment. This was the underlying assumption when the Legislature and the voters approved \$9 billion in state bond funds with the passage of Proposition 1A in 2008, which was approximately 20 percent of the estimated system cost at that time. It is worth noting that there were no other established funding sources for the program in place at the time.

Over the last 11 years, the Authority secured approximately one-third of the funds needed to complete the current estimated cost of the system:

- In 2009, one year after the passage of Proposition 1A, the Authority received \$2.5 billion in funds made available through the American Recovery and Reinvestment Act of 2009 (ARRA);
- One year later, in 2010, \$929 million in additional federal funding was authorized through a Fiscal Year (FY10) Transportation, Housing and Urban Development grant;
- In 2014, the Legislature appropriated 25 percent of the annual proceeds from the Cap-and-Trade Program to support the

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Chapter 5: Program Issues

development and construction of the system, providing an ongoing revenue stream; and

- In 2017, the Legislature extended the Cap-and-Trade Program through 2030.

The Authority is currently operating on a pay-as-you-go funding approach, which means that contracts are let as funding is available. However, the continuation of this approach indefinitely will not support our delivery schedule.

In its March 30, 2018, letter to the Legislature on the Draft 2018 Business Plan, the California High-Speed Rail Peer Review Group (PRG) discussed this issue and made the following points on funding for the program:

- The Draft 2018 Business Plan highlights the fact that there is a continuing and growing funding gap that must be addressed to complete service between San Francisco and Bakersfield and, eventually, to Los Angeles and Anaheim in Phase 1 of the system;
- The Authority can no longer be expected to deliver a project for which the proposed scope is not matched by adequate and reliable funding; and
- It will be essential to develop a realistic program of project finance by revenue source and agency (local, state, federal, private) and a realistic discussion of the predictability of funds generation.

The PRG laid out, in broad terms the options before the legislature. They recognized that the best likely option given the current financial constraints was

to “[c]omplete the existing committed work in the Central Valley and provide connections to the existing San Joaquin service so that use could be made of the investment and the ARRA funding would not need to be repaid.” This is the path the Authority is pursuing with the Merced-Fresno-Bakersfield line.

The PRG concluded its letter stating that it “...believes that rail passenger service, including high-speed rail service, is important to the economic growth of the State and can play a central role in the State’s future transport network...unfortunately, the high-speed rail program as it is currently defined and financed will not be able to support the role that high-speed rail could have in the state’s future transportation system.”

At a Legislative hearing on March 26, 2019, on the status of high-speed rail, the PRG reiterated its comments that the funding needed for delivering the system is not in hand. The PRG is correct in noting that this handicaps our ability to deliver the full Phase 1 system and our ability to project when it might be completed. At the same time, the Authority acknowledges that policymakers require more confidence in the Authority’s ability to deliver the project before considering additional funding for it. Toward that end, Authority management recommends the building block approach laid out in this 2019 Project Update Report.



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Chapter 6: Program Risk



CHAPTER 6: PROGRAM RISK

Legislative Requirement: This chapter covers statutory requirement (h) A thorough discussion of risks to the project and steps taken to mitigate those risks.

In discussing the risks present on the California high-speed rail program, it is important to note that potentially significant risks are common to all mega-projects of similar magnitude and complexity. It is the successful management of these risks that defines the success of these programs. For the high-speed rail program, the current significant risks include:

- Our relationship with the Federal Railroad Administration (FRA);
- Funding;

- Cost increases;
- Schedule delays; and
- Other construction and program risks.

The Authority is mindful of the importance of aligning service implementation plans with funding and schedule risk. Authority staff is developing future rail procurements (track and systems, and trainsets) to ensure maximum flexibility to respond to funding risk and schedule variability. The Authority is achieving this through multiple identified geographic segments/phases—each having an independent Notice to Proceed—as well as establishing escalation indices to minimize costs due to funding and schedule changes. This will allow the program to advance, yet manage associated variability risks.

Chapter 6: Program Risk

Federal Disengagement

The FRA's lack of engagement is a major risk to the Authority in several crucial areas:

- NEPA Assignment and/or FRA's action in completing environmental documents;
- Funding to complete the First Construction Segment;
- Development of an operational Contingency Plan; and
- Ultimate certification of completed work and rail operations.

The FRA's disengagement also affects the Los Angeles County Metropolitan Transportation Authority's (Metro) Link US Project because the Authority was set to assume the role of "lead agency" under the Authority's application for NEPA Assignment. The request for NEPA Assignment has not been approved by the FRA, and the FRA has not fulfilled its obligations as lead NEPA agency on the Link US Project.

The FRA's disengagement presents a serious schedule risk and cost implications for the Authority pending FRA's action as required by the ARRA agreement. Although the lack of engagement since February 2019 affects many aspects of the program, the pending NEPA Assignment request since July 2018 has already contributed to additional costs and delays.

The Authority is still waiting for a final decision on its request for NEPA Assignment from the FRA and the U.S. Department of Transportation. Without an approved NEPA Assignment or the FRA resuming its federal oversight responsibilities, the Authority cannot complete NEPA environmental reviews. This affects the Authority's ability to define the scope and estimate for future projects. It will also affect

the Authority's ability to achieve the Merced-Fresno-Bakersfield line. For a full discussion, see **Chapter 5, Program Issues.**

Current Funding

The availability of sufficient funding presents the biggest challenge to the Authority and the greatest risk to delivering both the Silicon Valley to Central Valley Line (Valley to Valley) and Phase 1. This challenge extends further than the present threat from the FRA, although the FRA's current position compounds the problem.

In our 2016 Business Plan, we assumed that Cap-and-Trade would not sunset until 2050, enabling the Valley to Valley Line to be fully funded. However, the passage of AB 398 established 2030 as the sunset date. Although the 2030 date provided more certainty to our funding future, the 2030 date necessarily reduced the duration and quantity of our funding projections. Also, Cap-and-Trade auctions continue to bear the risk of volatility and the certainty of future receipts is not guaranteed.

In our 2018 Business Plan, we proposed using the available funding toward investments in both the Central Valley and the San Francisco Peninsula. For early service, however, based on the Early Train Operator's analysis, we are recommending that the Authority's resources be focused on a longer segment in the Central Valley, the Merced-Fresno-Bakersfield line. This line is within our current funding capacity, and focusing our resources on this line will allow us to deliver usable assets and demonstrate the benefits of high-speed rail to Californians as early as possible.

The composition of the identified funding for this section still contains inherent challenges that include volatility, the possibility of rescission of federal funds and approval risk. By successfully accessing these

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sources, we believe that it is possible to deliver infrastructure capable of delivering high-speed rail operations in the Central Valley. This section further details the key risks to the available funding.

Proposition 1A

Proposition 1A was passed by voters in 2008, creating a \$9 billion dedicated source of funding for California high-speed rail. The California Legislature appropriated Proposition 1A bond proceeds in the amounts of \$2.609 billion for Central Valley construction and \$574.8 million for program-wide project development costs.

Access to remaining Proposition 1A funds could be delayed for various reasons. The Authority will have to work closely with the Legislature, Governor and Department of Finance to assure timely appropriation of Proposition 1A funds to keep the project on schedule.

Mitigation

The Authority works in close coordination with the State Attorney General's Office, the Department of Finance (DOF) and the State Treasurer's Office to facilitate Proposition 1A bond sales on a timely basis to meet project cash flow needs.

Staff have developed detailed timelines that describe the critical path requirements necessary to secure approval for accessing the remaining Proposition 1A funds. This mapping process has identified the need to engage stakeholders early in the process and potentially pursue a two-stage approach for future bond requests. The Authority envisions funding plans for an initial request of the remaining Proposition 1A funds to be submitted as early as FY2020-21.

To avoid delays in the budget request process, the Authority will proactively discuss and work with the DOF and legislative committees on a Proposition 1A strategy to ensure that required documents are prepared and transmitted in accordance with statute and stakeholder expectations. The Authority will submit on a timely basis each required Proposition 1A funding plan (S&H section 2704.08) to the Legislature and the DOF for approval of future appropriations of state Proposition 1A bond funds.

Cap-and-Trade

The primary risk to Cap-and-Trade funding is that receipts will be lower than forecast. Because Cap-and-Trade is an auction-based revenue source that is contingent upon market factors, it is not possible with certainty to predict the results of future auctions. This makes planning for projects that include Cap-and-Trade as a revenue source challenging because of the uncertainty of future receipts.

With the Legislature's extension of the Cap-and-Trade Program through 2030, quarterly auctions have been strong—an indication that the market has reacted positively to the legislation. The Authority has forecast potential future receipts from the Cap-and-Trade auctions. If these differ significantly from the Authority's forecasts, the Authority may not be able to meet program requirements and will need to adjust program expectations accordingly.

Mitigation

The Authority continues to monitor Cap-and-Trade auction results and actively manages commitments of Cap-and-Trade funds. For planning purposes as documented in the 2018 Business Plan, the Authority has assumed average annual receipts of \$750 million in the fiscal years moving forward. This assumption is

Chapter 6: Program Risk

supported by California's Legislative Analyst's Office (LAO), which published the *Cap-and-Trade Extension: Issues for Legislative Oversight* report in December 2017. The report notes a low and a high revenue scenario, which results in the Authority's share of expected revenues ranging from \$500 million to \$1 billion in 2018 and from \$500 million to \$1.7 billion by 2030. On a cumulative basis, this range would generate from \$71 billion to \$18.4 billion through 2030. The four most recent quarterly auctions have resulted in annual proceeds totaling \$767 million.

Through periodic sources and uses modeling and cash management analysis, the Authority has strong controls in place to identify the magnitude of currently available funding relative to funds already committed. As part of the funding allocation process, the Authority takes into account current program obligations and anticipated sources and uses. Funds are then allocated to ensure that current commitments are met and that priority projects can be funded.

If Cap-and-Trade funds were to become unavailable or were to fall significantly below projections, the Authority could use Proposition 1A to fill any short-term gaps in required revenues. This would be limited to the amount of Proposition 1A funds that were unexpended, or otherwise not committed to other program needs.

FY10 Federal Funding

Currently, the Authority is fulfilling the obligation to match ARRA expenditures that were completed in September 2017. Federal reimbursement of program expenditures was completed under a tapered match approach where all ARRA federal funds were

expended first. The Authority met this spending deadline. The grants require the Authority to fulfill the ARRA match obligations and increased costs to complete the federal grant scope of work prior to requesting FY10 reimbursements. In the February 19, 2019, letter to CEO, Brian Kelly, the FRA indicated their intent to de-obligate the full \$929 million provided in the FY10 grant agreement.

Mitigation

The Authority has undertaken a comprehensive re-evaluation of the costs and schedule to complete the federal grants scope as part of the recently approved baseline cost estimate. Additionally, the Authority is actively managing construction contracts to ensure that forecasted monthly expenditures increase to the level required for timely completion. Although there is currently sufficient time to accommodate slower than forecasted expenditures, this will affect the timing of when the Authority may access FY10 federal funds. There is, however, a limit to this, and the Authority is actively working to accelerate construction spend.

The identification of further state-match funds may be necessary to access FY10 funding. The Authority has anticipated this possibility by selling more than \$2.6 billion in Proposition 1A bonds to date. In addition, the state can also use Cap-and-Trade funding as available should Proposition 1A funds become unavailable for any reason.

In letters to FRA on March 4, 2019, the Authority responded to FRA's February letter. In addition, the CEO offered to work collaboratively to restore a normal working relationship so that the state and its federal partner can deliver this important project. The Authority remains ready and available to engage with the FRA at the earliest possible time.

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American Recovery and Reinvestment Act (ARRA)

The FRA has continued, until recently, to review Authority match invoices for ARRA eligibility. Prior to its February 2019 letter, the FRA had excluded some specific items as not meeting match requirements. The Authority has been working with the FRA to answer the agency's questions and respond to its rejections. This review process is ongoing and anticipated to last through the end of the state match period.

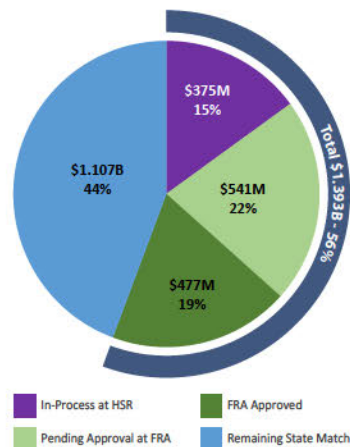
In September 2017, the Authority successfully completed the tapered match approach to the ARRA Grant agreement. Since then, the Authority has been well on its way in matching the \$2.5 billion in federal funding. As of April 2019, only a third of the period for achieving this match has expired, and the Authority has more than half of match-eligible expenditures either approved by FRA, pending FRA approval, or in-process to be submitted to FRA.

As shown in Exhibit 6.0, the Authority has 19 percent, or \$477 million, of FRA-approved state match expenditures, \$541 million is pending FRA approval, and \$375 million in eligible expenditures is in-process at the Authority to be submitted to the FRA—totaling \$1.393 billion in match to-date, with only 44 percent remaining to be matched by December 31, 2022.

A protracted process to resolve differences between the Authority and FRA could impact the Authority's ability to meet the grant's match requirements in a timely manner. On a related front, although Proposition 1A bond proceeds have already been received by the Authority, if additional state funds are required to meet federal requirements, there is a risk that sufficient additional Proposition 1A proceeds

may not be available for this purpose. Additionally, the FRA also indicated in its February 2019 letter that it was exploring remedies to reclaim previous ARRA reimbursements and terminate the ARRA agreement.

EXHIBIT 6.0: ARRA STATE-MATCH STATUS UPDATE



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Mitigation

The Authority has worked collaboratively with the FRA to facilitate the ARRA state-match review by holding monthly meetings and submitting additional documentation to validate the state match. In addition, to mitigate the possibility of extended negotiations with FRA, the Authority has currently prioritized the submission of state-match invoices that the FRA has previously flagged as lower risk. It is important that the monthly meetings are re-established to ensure that the state-match process is successful.

If future Proposition 1A funding is delayed as additional contributory state matching funds for the ARRA funding, the Authority will utilize appropriated Cap-and-Trade funds in its place.

We identified three drivers associated with the increase in costs:

- Scope changes;
- Higher net cost estimates; and
- Higher contingency level assigned to risks.

Over the last two years, the Authority has reported on several common risk themes, such as right of way, third-party agreements and scope changes affecting all three Construction Packages. Effectively managing the risk in these key areas will enable the Authority to successfully control future cost increases.

Mitigation

We have discussed the significant program and management issues we face in delivering this program in Chapter 5, Program Issues. Within this chapter, we discussed governance and reporting improvements along with the Authority's organizational evolution to ensure fully informed decision making. These positive changes have improved our identification, assessment and proposed mitigation of the risks that face the program.

Cost and Schedule Risks

Although faced with clear risks, the Authority is actively working to identify mitigation strategies related to cost increases and schedule delays. This section outlines current strategies to known and unknown risks associated with cost and schedule.

Cost

Chapter 2, Capital Cost Review, discusses the proposed increase in the Central Valley Segment. Although cost increases are not unusual for programs of this complexity and size, it is imperative that cost increases are fully understood and mitigated to the fullest extent possible. Given the funding risks noted above within an already funding constrained environment, further cost increases threaten the program.

Scope changes, which were \$362 million, were affected by change conditions that existed prior to the finalization of the 2018 Program Baseline but had not been identified and assessed to be accounted for in the baseline budget. The improved project delivery and governance structure that is now in place, along with the reporting improvements, has allowed management to identify and assess scope change impacts in a more timely and accurate manner. The key to minimizing the

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cost impact of scope changes is extremely proactive communication between the relevant stakeholders. Communication of potential change issues need to begin as soon as they are identified. The Authority has made solid progress in this area. Coordination between the design build contractors, the contract program managers and the Authority has improved through continuous engagement of the relevant parties to resolve issues.

Cost estimate increases totaled \$477 million. These estimate increases resulted from changes in project execution, such as the procurement approach for the Northern Extension, underestimating costs to complete work scope and delay costs. Accurately estimating the costs to complete for required work scope is one of the key competencies required to develop a sound program budget. The establishment of the 2018 Program Baseline and the improved project reporting and governance structure has allowed the development of more accurate estimated costs at completion. The program can now track performance against these estimates more efficiently and, importantly, take corrective actions as required.

The cost update includes a recommended additional \$990 million in contingency over the 2018 Business Plan amount—this is the result of a comprehensive risk-analysis exercise, directed by the CEO, including a detailed Monte Carlo risk analysis completed for the Central Valley Segment. This is the result of the Authority staff recommending a 70 percent confidence level budget. Increasing the confidence level of a project budget increases the contingency and the total program budget. However, it is one of the most effective management tools used on programs.

The Authority has now detailed the potential remaining risk exposure and estimated the costs of addressing these issues. Staff are currently negotiating with each construction contractor to resolve these risks and has made significant progress over the last year in defining and evaluating the contractor claims. Negotiations with the contractors are expected to be completed by summer 2019.

Schedule

The existing design-build contractors' production has been impacted for numerous years due to delays in completing pre-construction activities. These setbacks are primarily from emerging third-party requirements and associated scope increases, lack of environmental clearances for changed conditions and associated right of way delays. These issues were detailed in Chapter 4 of our 2018 Business Plan and confirmed by the State Auditor in her November 2019 Audit Report.

Mitigation

To manage delay risk on the high-speed rail project, the team implemented a robust risk management process and controls to properly assess, control and monitor risks once identified. Specific to delay risk, critical paths for activities have been clearly identified and included in performance reporting. Progress along these critical paths receive the highest priority in meetings as it is clear to all that meeting critical path milestones is how successful execution is managed and judged.

The Authority is implementing a coordinated and deliberate effort with the design-build contractors. Each contract alignment is divided into a mile-per-mile of guideway and individual structures and specific site issues have been

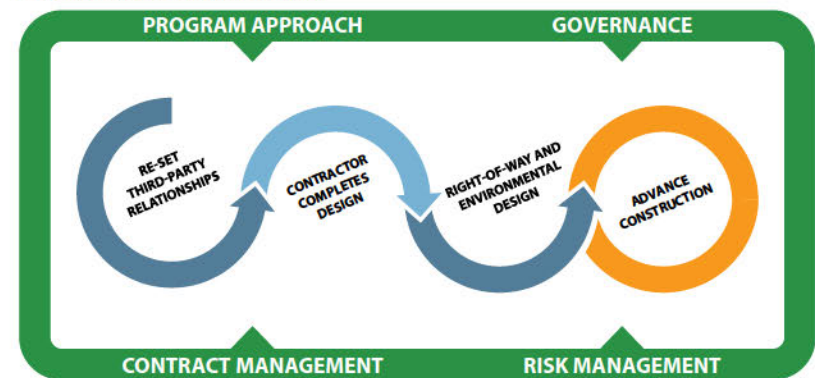
identified and action plans are being actively managed for resolution. Associated resolutions accounted within the contractor provided project schedule are enabling a coordinated state and contractor "ball-in-court" action response.

The focus of this conscious and collaborative effort is for the contractor to complete all remaining design. In doing so, all latent third-party requirements and issues can be addressed, and design reviews and other collaboration can be completed. This allows for either adherence to existing master agreements or the identification of additional construction scope. The completion of designs also ensures final determination of required project footprints and then resolution of necessary right-of-way transactions and environmental clearances. With designs complete, the third-party requirements fulfilled, right-of-way procured and environmental approvals fully satisfied, contractor construction can fully engage, as shown in Exhibit 6.1.

The Authority has strategically modified its overall approach to emphasize a holistic program approach focused on a location rather than on individual program areas. Accordingly, program teams work collaboratively to address all issues facing a particular area. Contract management, rigorous governance oversight, and vigorous risk management enhance the delivery of this work. This has allowed project priorities and issues to be aggregated at the program level and communicated to Third-Parties ensuring continuity and final resolution.

The Authority has put a renewed emphasis on contract management to better align contractor and consultant efforts to State objectives and eliminate redundant efforts. The updated Authority governance process and procedures have ensured a commitment to organizational oversight and delivery. In doing so structured configuration and change management processes have reinforced plan execution.

EXHIBIT 6.1: HOLISTIC PROGRAM APPROACH



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Finally, a holistic risk management approach is also being applied as a result of the updated Monte Carlo risk-analysis work conducted since the 2018 Business Plan. This has led to a greater understanding and more complete identification of outstanding risks, and the development of action plans for mitigation as further discussed below.

Other Construction Risks

To manage risk on the high-speed rail project, the team put in place a robust risk-management process and mechanisms to properly assess, control and monitor risks once identified. This section will focus on several key themes, the risks that remain and mitigation efforts to manage these following areas of concern:

- Right-of-way acquisition;
- Third-party agreements;
- Stakeholder requirements;
- Scope changes;
- Regulatory compliance; and
- Specialized technical design.

Right-of-Way Acquisition

In 2018, the Authority received a significant legislative approval through SB 1172 that provided high-speed rail with expanded right-of-way acquisition approvals. This simplifies the right-of-way acquisition process for the Authority and will improve the acquisition schedule for the remaining parcels necessary for completion of the Central Valley construction. As shown in **Table 6.0**, the Authority has acquired approximately 82 percent of the parcels required to complete construction in the Central Valley.

TABLE 6.0: RIGHT-OF-WAY ACQUISITION STATUS (AS OF 3/31/19)

Section	Number of Parcels	Parcels Acquired	Remaining Parcels
CP 1	877	816	61
CP 2-3	749	521	228
CP 4	190	164	26
Total	1,816	1,501	315

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The extension of construction north to Madera in the CP 1 alignment has increased the amount of right-of-way acquisition. Risks in CP 2-3 and CP 4 relate to obtaining critical parcels, as promised. These are primarily related to structures that require advance geotechnical investigations to complete the designs for CP 2-3 and to complete mainline grading for CP 4.

Mitigation

In addition to leveraging the procedural benefits of SB 1172, Authority staff continue to work with the contractors to progress design, re-sequence work activities and prioritize parcel acquisitions. In addition, staff also are working with property owners to obtain early access to conduct critical geotechnical evaluations.

Monthly reports continue to show right-of-way acquisition progress and the remaining challenges that need to be addressed in a timely manner to

lessen this risk's effect on overall project delivery. Progress issues raised by these reports receive high priority by management and are addressed with an integrated project team response.

Third-Party Agreements

Execution of third-party agreements continue to be an area of risk in construction. Many of the master agreements are now in place with BNSF, Union Pacific Railroad, AT&T, PG&E and various irrigation districts. However, many require multiple agreements related to right-of-way purchases, ultimate construction and ongoing maintenance. All require ongoing management and coordination with the design-build contractors to complete design review approvals and schedule coordination for utility relocation outages or high-speed rail construction.



PHOTO: THE ROAD 27 OVERCROSSING WILL BE OVER 700 FEET LONG WITH THE LONGEST SPAN STRETCHING 198 FEET.

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Mitigation

The Authority has hired specialized expertise to assist with complicated utility agreements and relocation coordination. The Authority also instituted "get-to-work" schedule reviews. These reviews ensure that agreements are in place and that the various stages of review, approval and, ultimately, construction are complete without any significant effect to construction activities. Regular coordination, engagement and a single point of contact with the third parties has been implemented resulting in better outcomes and ensuring program wide consistency. Executive level meetings are being held to build more effective working relationships, and to ensure that issues are captured, highlighted, addressed and concluded at the earliest opportunity.

Stakeholder Requirements

The Authority also works with other government agencies to address specific local standards and issues. This risk has primary been related to local and state roadway standards for grade separations and realignments. Some standards have changed since the release of the Construction Packages. In addition, added reviews and coordination have affected construction schedules.

Mitigation

The Authority is working with local cities and Caltrans to better understand standard changes and review the specific impacts to city- or state-owned roadways. Staff are working to identify critical areas of concern and general approaches to incorporate updated standards. In addition, staff are proposing variances on a case-by-case basis. Executive and technical level meetings are being held to build more effective working relationships.

Scope Changes

A number of activities led to scope changes to the existing contracts. These included decisions such as extending construction north to Madera, in November 2015, for better connectivity with existing rail services, changes in design requirements to expedite construction, and resolution of litigation resulting in settlements with local communities, such as Wasco. These, and other changes, altered the scope of the original design-build contracts.

These additions require significant work to define the scope, provide sufficient engineering to define the project footprint to allow completion of environmental examinations, to develop and submit permitting amendments as necessary, to identify the right of way required and to continue coordination with local stakeholders, utilities and railroads. Although the changes may benefit the Authority and stakeholders in the long term, if not managed, the changes could result in time and cost increases.

Mitigation

The Authority is working collaboratively with stakeholders—including communities, utilities, railroads, permitting agencies—and the contract teams to fully define these scope changes and the requirements to complete them. These changes will result in increased costs to complete the Central Valley construction. Some elements, such as design, have already been included in existing contracts, but others related to construction are still yet to be determined. Coordination with stakeholders is critical where design reviews affect construction of the high-speed rail line. The get-to-work reviews are monitoring the possible effects on construction. In addition, the Authority is evaluating alternative construction strategies to ensure timely and cost-effective delivery.



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Regulatory Compliance

As the permits have been acquired for construction, additional mitigation requirements have been identified. Amendments are taking longer because the designs have not been finalized or the quantity of mitigation is larger than what has already been purchased or is difficult to find. The development of mitigation measures and the implementation for construction have resulted in delays and, in some cases, increased costs beyond what had been originally anticipated.

Mitigation

The Authority and Project Construction Managers continue to work with the design-build contractors to ensure that environmental permitting requirements are clear and implementable. In addition, they coordinate with regulators to ensure that mitigation is reasonable and ensure the contractors track any deliverables to demonstrate compliance.

Continued Organizational Development

As the organization evolves and strives to deliver the Merced-Fresno-Bakersfield line, additional organizational capacity and capability will need to be added. This will include:

- Further contract/commercial skills building on work already done in response to the State Audit but looking specifically to manage multiple procurements and delivery of the new construction packages, track, systems and rolling stock procurements;

- Enhanced right-of-way and third-party teams to prepare to advance the activities for the above procurements so the Authority does not repeat the problems of the past in getting ready for construction;
- Further roll-out of the Program Management Plan to lower levels of organization to provide greater clarity of roles and responsibilities;
- Utilizing the maturing Program Controls reporting documents to provide common data for transparency/accountability of progress to the Board, the Legislature and to the public; and
- Continued review of state and contractor resources to ensure the appropriate mix and use of capabilities.

Mitigation

The Authority is outlining what will be required and how the organization will evolve to move the extensions to Bakersfield and Merced forward. Future revisions to the Program Management Plan will describe how this new staffing will integrate with the rest of the organization and define applicable roles and responsibilities. This will occur over the next several months as the Authority awaits FRA re-engagement and the ability to complete the environmental clearances.

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Specialized Technical Design and Design Changes

As construction has progressed, several technical design issues have been identified. Some were the result of contractor changes and/or proposed designs; others were due to stakeholder or regulatory requirements. Some examples include retaining-wall redesign for embankments and the implementation of intrusion-protection barriers required for passenger/freight collision safety.

Design Changes

These design changes required additional work by the Authority and contractors to refine designs to address technical implementation issues. Changes, if not resolved through a formalized change management process, can become the major source of contract disputes, which presents a severe risk contributing to additional project costs.

Mitigation

The Authority has worked with the Project Construction Managers to clearly define specific design requirements. In addition, this has involved further coordination with stakeholders, such as the railroads and other regulatory agencies, to ensure the new designs also address their requirements. Changes are being logged, analyzed, estimated and processed in a timely manner to minimize impacts to the schedule.

Managing Future Tunneling Challenges

Although the tunneling aspects of the program are among the most challenging elements of the system, they are buildable. There are still many unknowns associated with the engineering and environmental challenges with tunnels through specific mountainous terrains.

Mitigation

To address these unique seismic and other underground conditions, we intend to take early and ongoing actions to ensure that they are delivered successfully. We are creating a blue-ribbon Tunnel Delivery Advisory Panel (TDAP) to help us identify the areas of greatest risk.

This panel will advise on a range of issues and questions, with specific early focus on the Pacheco Pass tunnels and outreach to industry tunneling experts. Our target audience will include tunneling contractors, tunnel-boring-machine manufacturers, tunneling engineering firms, geotechnical engineering firms and firms specializing in tunnel construction and risk management.

In seeking this feedback, we will focus on three primary areas:

- Technical specifications and cost;
- Delivery models, contract packaging and risk transfer; and
- Procurement and funding strategies.

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Chapter 6: Program Risk

Litigation

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.

CEQA Legal Challenges

County Of Kings v. California High-Speed Rail Authority - Sacramento Superior Court, Filed June 5, 2014.

On May 7, 2014, the Board certified that the Final EIR/EIS for the Fresno to Bakersfield project section had been completed in compliance with CEQA. Afterward, five parties filed lawsuits under CEQA alleging that, among other claims, that the Authority certified a legally inadequate EIR, failed to recirculate the revised draft EIR properly, and made inadequate CEQA findings. A few of the lawsuits also included minor, non-CEQA claims.

Mitigation

Since the 2017 Project Update Report, four of the five parties settled; only Kings County remains. In addition, the Authority did not receive any new challenges on the recently published Supplemental Fresno to Bakersfield Environmental Impact Report.

Proposition 1A Legal Challenges

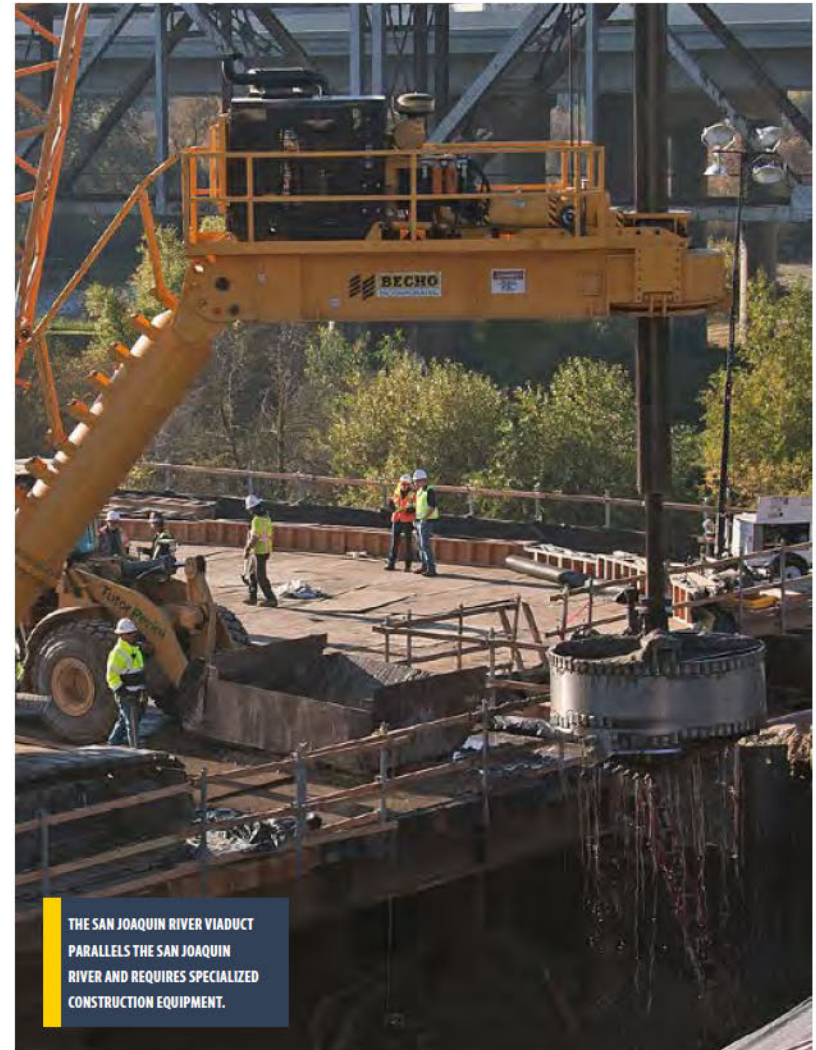
John Tos, Town Of Atherton, County Of Kings, et al. v. California High-Speed Rail Authority - Sacramento Superior Court, Filed December, 13, 2016

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 would allow Proposition 1A bonds to be sold after Department of Finance review and approval. The lawsuit alleged 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 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 and, therefore, the two funding plans adopted by the Board of Directors in December 2016, which relied upon AB 1889. 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.

Mitigation

Recently, the Superior Court ruled in the Authority's favor, finding that AB 1889 was constitutional. All parties stipulated to enter a final judgment in the Authority's favor. The case may be appealed by Tos, et al.



THE SAN JOAQUIN RIVER VIADUCT PARALLELS THE SAN JOAQUIN RIVER AND REQUIRES SPECIALIZED CONSTRUCTION EQUIPMENT.