

**Independent Financial Advisor Report  
To California High-Speed Rail Authority Regarding:**

# **Proposition 1A Funding Plan**

Project Finance Advisory Ltd. (PFAL)  
September 4, 2022





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# Key Terms and Definitions

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**AB 180:** Assembly Bill 180, passed by the California State Legislature and signed by Governor Newsom in June 2022, amends the 2021 Budget Act and appropriates \$4.2 billion in Proposition 1A bond funds for the 119-mile Central Valley Segment.

**AB 1889:** Assembly Bill No. 1889, Stats. 2016, Ch. 774

**ACE:** Altamont Corridor Express

**ARRA:** American Recovery and Reinvestment Act Grant as amended in May 2016 between the FRA and Authority

**Authority:** California High-Speed Rail Authority

**CM:** Construction Management

**CM/GC:** Construction Manager/General Contractor

**CP:** Construction Package

**DB:** Design Build

**DEA:** David Evans and Associates, Inc.

**EMMA:** Environmental Mitigation Management and Assessment

**FEIR / EIS:** Federal Environmental Impact Report / Environmental Impact Statement

**FRA:** Federal Railroad Administration

**Funding Plan:** 2021 Proposition 1A Funding Plan

**FY10 funds:** a \$929 million federal grant from Transportation, Housing and Urban Development

**FY 2010:** the FY 2010 Cooperative Agreement between the FRA and Authority as amended in June 2021

**GO:** General Obligation

**HMF:** Heavy Maintenance Facility



**High-Speed Train Operation:** Authority high-speed train service as envisioned in the 2022 Business Plan and Ridership and Revenue Forecasting Technical Supporting Document to the 2022 Business Plan.

**HSR:** High-Speed Rail

**IOS:** Initial Operating Segments

**MMEP:** Mitigation Monitoring and Enforcement Plan

**MOU:** Memorandum of Understanding

**NTP:** Notice to Proceed

**OHLE:** Overhead Line Equipment

**P3:** Public Private Partnership

**Passenger Train Service:** Conventional rail service such as San Joaquin service (operated by San Joaquin Joint Powers Authority) between Sacramento, Oakland, and Bakersfield

**PFAL:** Project Finance Advisory, Ltd.

**Phase 1:** California High-Speed Rail Program Phase 1, as defined in Streets and Highways Code 2704.04(b)(2)

**PMP:** Program Management Plan

**Prop 1A:** Proposition 1A, the Safe, Reliable High-Speed Passenger Train Bond Act for the 21st Century, (added by Stats. 2008, Ch. 267 (AB 3034)), codified at Streets and Highways Code 2704, et seq.

**ROD:** Record of Decision

**RFC:** Release for Construction

**RFP:** Request for Proposal

**RFQ:** Request for Qualifications

**Report:** Independent report pursuant to California Streets and Highways Code 2704.08(d)(2)

**RRIF:** Railroad Rehabilitation & Improvement Financing Act



**Segment:** Central Valley Segment

**SB 198:** SB 198, passed by the California State Legislature and signed by Governor Newsom in June 2022, establishes priorities for High-Speed Rail investments with a priority on completing an electrified two-track railroad between Merced and Bakersfield, including a shared station in Merced with Amtrak and ACE passenger rail services. SB 198 also includes provisions related to Legislative reporting and project oversight.

**SB 1029:** Senate Bill No. 1029, Budget Act of 2012, (Chapter 152 of the Statutes of 2012)

**SHC:** Streets and Highways Code

**SR 99:** State Route 99

**TIFIA:** Transportation Infrastructure Finance and Innovation Act

**TSC:** Track and Systems Contract

**USDOT:** US Department of Transportation

**“Operating and Maintenance Costs,”** within the meaning of Streets and Highways Code section 2704.08, subdivision (d)(2)(D)) means: ongoing operating and maintenance costs, that is, the cost of running the trains and maintaining the infrastructure and rolling stock in a state of good repair. It does not include capital asset renewal (or lifecycle) costs, which is the cost of replacing or refurbishing worn out components at the end of their useful life.

**“The planned passenger service to be provided by the Authority, or pursuant to its authority, will not require an operating subsidy”** means: within a reasonable period of time after commencement of high-speed train operations on the usable segment, project revenues will reach an operating break-even point at which aggregate revenues up to that point in time equal Authority-borne operating and maintenance costs to that point in time and such revenues will continue to equal or exceed operating and maintenance costs thereafter.

**“Revenues,”** within the meaning of Streets and Highways Code section 2704.08, subdivision (d)(2)(D)) means: fare box revenues and ancillary revenues. Fare box revenue is income from ticket sales. Ancillary revenues include other income the Authority may receive from sources related to the everyday business operations of the high-speed rail, including but not limited to on-board sales (e.g., sales of foods or sundries), station-related revenues, advertising, and revenues from leases of excess



or non-operating right-of-way parcels or areas, as well as areas above or below operating rights-of-way or of portions of property not currently being used as operating rights-of-way. Ancillary income does not include unexpected or “one time” events.

**“Suitable and ready for high-speed train operation”** as stated in Assembly AB 1889 means: if the bond proceeds, as appropriated pursuant to Senate Bill 1029 of the 2011–12 Regular Session (Chapter 152 of the Statutes of 2012), are to be used for a capital cost for a project that would enable high-speed trains to operate immediately or after additional planned investments are made on the corridor or useable segment thereof and passenger train service providers will benefit from the project in the near-term.”

**“Useable segment”** means the 119-mile Central Valley segment from Madera to Poplar Avenue and includes stations at Fresno and Kings/Tulare.



## **Disclaimer**

Project Finance Advisory Limited (“PFAL”) has performed an independent review of the statutory compliance of the 2021 Proposition 1A Funding Plan (“Funding Plan”) with California Streets and Highways Code 2704.08(d)(2) as described in PFAL’s executed agreement with the California High-Speed Rail Authority (“Authority”) dated November 2015. This independent review was performed using documents provided by the Authority (listed in the Bibliography and body of this Report) and developed using current accepted professional practices and procedures. PFAL, with the Authority’s permission, has relied on the accuracy and completeness of the documents provided by the Authority. This Report does not serve as an accounting audit. Furthermore, this Report should not be relied on for any financing or investment decision. It is possible that there are other elements of risk associated with the Funding Plan beyond those presented. Any financial estimates, analyses or other information used by PFAL in connection with the Report represent the general expectancy concerning events as of the evaluation date and are based solely on the information reviewed by PFAL. However, the accuracy of any financial estimate, analysis or other information is dependent upon the occurrence of future events that cannot be assured. Additionally, these estimates and analyses rely on the assumptions contained therein, the accuracy of which remains subject to validation, further refinement and future events. Estimates should not be construed as statements of fact. There will usually be differences between the projected and actual results because events and circumstances do not occur as expected, resulting in possible differences.





# Executive Summary

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Project Finance Advisory Limited (“PFAL”), together with our subconsultant, David Evans and Associates, Inc. (“DEA”), was appointed by the California High-Speed Rail Authority (“Authority”) to provide independent consultant services following a competitive procurement process that concluded in November 2015. Our role is to fulfill the statutory requirement to perform independent analysis of the Authority’s funding plans and to indicate if the funding plans meet the specified criteria listed below.

This Report provides our independent analysis of the statutory compliance of the 2022 Proposition 1A Funding Plan (“Funding Plan”) dated September 1, 2022 developed by the Authority in compliance with California Streets and Highways Code (“SHC”) 2704.08(d)(1) as clarified in Assembly Bill 1889 (“AB 1889”). The Funding Plan calls for \$4.2 billion of Proposition 1A (“Prop 1A”) bond proceeds as part of the funding for ongoing construction work on the Central Valley segment (“Segment”), the 119-mile segment from approximately adjacent to the Madera Amtrak Station to Poplar Avenue. The review performed by PFAL as documented in this report is a condition precedent to utilization of any appropriated bond proceeds.

The purpose of this Report is to fulfill the requirements related to the Funding Plan for the \$4.2 billion Prop 1A bond proceeds that were appropriated by the state legislature in Assembly Bill 180 (“AB 180”) in June 2022:

- a) Construction of the corridor or usable segment thereof can be completed as proposed in the Funding Plan;
- b) If so completed, the corridor or usable segment thereof would be suitable and ready for high-speed train operation;
- c) Upon completion, one or more passenger service providers can begin using the tracks or stations for passenger train service;
- d) The planned passenger train service to be provided by the Authority, or pursuant to its authority, will not require an operating subsidy; and
- e) An assessment of risk and the risk mitigation strategies proposed to be employed.

As an independent consultant, PFAL and our team of subconsultants have a duty of care to the California State taxpayers to review the Funding Plan and to address the specified criteria listed above. In keeping with this responsibility, the analysis and conclusions in this Report are not prejudiced by any external interests; our conclusions are completely our own.



The analysis and conclusions provided in this Report are based on our review of material provided to us by the Authority as we describe in this Report. Our analysis and conclusions are based on our professional opinions and the opinions of our subcontractor DEA, who specializes in planning, design and engineering, surveying, and construction oversight for a wide range of railroad projects.

PFAL's review and development of this Report, as it pertains to forming an opinion for SHC 2704.08(d)(2), is limited in scope to the contents of the Funding Plan (and associated background information). It is beyond our scope to render an opinion on the SHC 2704.08(c) funding plans or the projects required to complete the overall high-speed rail ("HSR") system outlined in the 2022 Business Plan.

The approach PFAL implemented, further described in Section 1.1, to independently verify the criteria specified in SHC 2704.08(d)(2) is based on industry best practices and PFAL's previous roles of comparable assignments as independent financial advisor and auditor for the Federal Railroad Administration's ("FRA") Railroad Rehabilitation & Improvement Financing ("RRIF") program, the US Department of Transportation ("USDOT"), the Virginia Office of Public Private Partnerships, and the USDOT's Transportation Infrastructure Finance and Innovation Act ("TIFIA") Program, as well as many other government agencies in the US and internationally.

The Funding Plan was developed to satisfy the statutory requirements of SHC 2704.08(d)(1) and align with the appropriation in AB 180. The Funding Plan is consistent with the Authority's implementation plan as specified in the 2022 Business Plan. The Funding Plan addresses the statutory requirements of SHC 2704.08(d)(1) by providing:



Table 1: Segment Funding Plan Summary

SHC 2704.08(d)(1) requirements	Funding Plan Summary
<p>Identification of the corridor or usable segment thereof, and the estimated full cost of constructing the corridor or usable segment thereof</p>	<p>Funding Plan sets out current construction activities, along with the status and scope of construction packages and contracts associated with completion of the Segment; and provides projected program cost of \$13,855 million which includes capital costs, project support, reserve funds, and contingency. At the time of this report, the Authority was in the process of updating the project budget to reflect current project status and incorporate changes that have occurred since Fall 2021. The budget is being updated throughout 2022 to capture any changes as part of the 2023 Project Update Report, and therefore remains fluid. Furthermore, the 2022 Funding Plan indicates that the Authority will update its schedule and capital cost estimates in the 2023 Project Update Report, as required by SB 198 which will take into account risk of higher construction costs being passed to the Authority through increasing construction costs and escalation rates. Because these materials are under development, they were not reviewed by the PFAL team as part of this report.</p>
<p>Identification of the sources of all funds to be used and anticipated time of receipt thereof based on offered commitments by private parties, and authorizations, allocations, or other assurances received from governmental agencies</p>	<p>Sources of Funds for the \$13,855 million capital cost are identified as \$6,809 million of Prop 1A funds, \$3,009 million of Federal grants, and \$4,036 million of Cap-and-Trade proceeds.</p>
<p>Projected ridership and operating revenue report</p>	<p>The Funding Plan includes a description of the Authority's need to connect the Segment to the rest of the Merced to Bakersfield Line before high-speed train operations can begin as envisioned in the 2022 Business Plan. It also describes the future initial operating service, interim services, and interim use/independent utility options available to the Authority. The Funding Plan also provides details of the projected ridership and revenue during interim service and during initial service on the larger Silicon Valley to Central Valley Line, along with a peer review report confirming the ridership estimates as reasonable. However, since this segment is not initially planned for high-speed passenger service operated by the Authority, offering an opinion on the ridership and operations cost estimates is outside of the scope of this report.</p>
<p>Construction cost projection including estimates of cost escalation during construction and appropriate reserves for contingencies</p>	<p>The Funding Plan provides a summary level cost estimate for the Segment and references the 2022 Business Plan's Basis of Estimate document for the details of the methodology for the cost estimate. The Authority provided data on current expenditures, potential contract changes and cost contingency for the active construction and</p>



SHC 2704.08(d)(1) requirements	Funding Plan Summary
	management contracts and the Track and Systems contract, now planned to be awarded at the end of 2022.
A report describing any material changes from the plan submitted pursuant to subdivision (c) for this corridor or usable segment thereof	The Funding Plan details material changes from the initial February 2021 Funding Plan, including the Funding Plan's update to reflect the 2022 Business Plan implementation plan, amendments to the current and projected Cap-and-Trade funds, the inclusion of Prop 1A funds as appropriated in AB 180, the settlement agreement for restoration of FY10 federal grant funds, and extension of the project performance period and federal funding period.
A description of the terms and conditions associated with any agreement proposed to be entered into by the Authority and any other party for the construction or operation of passenger train service along the corridor or usable segment thereof	The Funding Plan includes summaries of key contracts for design services and Construction Packages 1-4, funding agreements for the Federal grants, a description of AB 180 and Senate Bill 198 (which includes specific reporting requirements by the Authority and oversight responsibility of the legislature), memoranda of understanding ("MOU") for environmental and station site planning responsibilities, and future agreements for train operation and rail delivery. Includes proposed future contracts for rail infrastructure procurement and interim service implementation strategy.

Aside from the information included in the Funding Plan itself, PFAL requested, received, and reviewed a variety of additional documents and data items including, but not limited to, technical specifications and other elements of the Track and Systems procurement documents, schedules, construction status reports, the Authority's Enterprise Risk Management Policy and Plan, details of cooperative grant agreements, the Authority's plan to meet the requirements under those agreements, and more detailed elements of the cost estimates. The Authority also provided bridging information to describe how the current construction plans and Funding Plan differ from the 2017 Central Valley Segment Funding Plan which was previously reviewed by PFAL in 2016 and the 2021 Central Valley Segment Funding Plan that was reviewed by PFAL in 2021.

The civil works described in the Funding Plan, collectively referred to as Construction Package (CP) 1-4, have been under construction since 2013 and account for approximately 51% of the total costs described in the Funding Plan. Construction management services, right-of-way, legal and third-party costs for CP 1-4 represent another 24% of the total costs for the Segment. As of June 2022, completed work on CP 1-4, including right-of-way, management, and other costs, was approximately 55% of the total budget. The Authority publishes detailed status reports for the active civil construction contracts monthly. The Segment Track, Systems and Trainset



Certification Facility contract will complete the remaining scope of work for the segment. The Authority issued its request for proposals (“RFP”) in December 2019 and proposals from the two remaining qualified proposers are due in fall of 2022. PFAL’s review of the rail infrastructure components yet to be awarded is based on available procurement documents developed by and provided from the Authority, including preliminary plans and specifications. The final contract terms and conditions may vary from the documents provided to PFAL, which could impact the cost and completion date for the project.

AB 1889 states that “early investments in the Bookends and elsewhere along the system, as defined in SB 1029 of the 2011–12 Regular Session (Chapter 152 of the Statutes of 2012), which will ultimately be used by high-speed rail trains, are consistent with the intent of the Legislature in appropriating funding and is consistent with Proposition 1A.” The Office of Legislative Counsel has determined that the Segment meets the requisite criteria for Prop 1A funds as described in AB 1889. The Segment will not provide stand-alone HSR operations until it is connected to the wider high-speed rail system. Because the scope of the Funding Plan does not include the stand-alone operations contemplated by SHC 2704.08(d)(2)(d), PFAL makes no findings on the matter of whether or not an operating subsidy would be required.

### **Key Findings**

The Funding Plan sets out to satisfy SHC 2704.08(d) for the commitment of \$4.2 billion of Prop 1A bond proceeds to be used as a source of funding for the Segment. PFAL has determined that the Funding Plan complies with the statutory requirements insofar as it addresses each of the SHC 2704.08(d)(2) criteria. Table 2 summarizes PFAL’s independent opinion on each component of SHC 2704.08(d)(2).



Table 2: SCH 2704.08(d)(2) PFAL Summary Opinion

SCH 2704.08(d)(2) requirements	PFAL Opinion
<p>Construction of the corridor or usable segment thereof can be completed as proposed in the plan submitted pursuant to the Funding Plan</p>	<p>The Segment can be constructed as proposed in the Funding Plan subject to the Authority implementing its enterprise risk management policies and plan, effectively mitigating identified and future risks to ongoing and future construction, and successfully awarding and delivering the Track and Systems contract. The current cost and schedule metrics should be reevaluated with the 2023 Project Update to verify that the adequate contingency is available to complete the project as currently planned. See Section 2</p>
<p>If so completed, the corridor or usable segment thereof would be suitable and ready for high-speed train operation</p>	<p>The Authority does not contemplate HSR passenger train service in this Funding Plan. Our assessment is that when completed as planned, the Segment will be suitable and ready for HSR operation as stated in AB 1889; See Section 3</p>
<p>Upon completion, one or more passenger service providers can begin using the tracks or stations for passenger train service</p>	<p>The Segment is expected to facilitate passenger train service initially through interim high-speed rail service provided through agreement with the San Joaquin Joint Powers Authority. See Section 4</p>
<p>The planned passenger train service to be provided by the Authority, or pursuant to its authority, will not require an operating subsidy</p>	<p>The Authority does not contemplate HSR passenger train service in this Funding Plan. Other passenger rail services contemplated for the Segment (Altamont Corridor Express (“ACE”) and San Joaquins rail and bus services) are not managed by the Authority, therefore they have not been analyzed as part of this report.</p> <p>Because the scope of the Funding Plan does not include the stand-alone HSR operations contemplated by SCH 2704.08(d)(2)(d) PFAL makes no findings on the matter of any operating subsidy, see Section 5</p>
<p>An assessment of risk and the risk mitigation strategies proposed to be employed</p>	<p>Risks are identified by the Authority, A comprehensive risk management program is in place and is being finalized; see Section 6 for a risk summary</p>



# 1. Funding Plan Overview

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## 1.1 PFAL REVIEW APPROACH & METHODOLOGY

The Authority requested that the PFAL team perform a review of the Segment Funding Plan. PFAL initiated the review in conformance with SHC 2704.08(d)(2) in March 2021, when the Prop 1A bond funding appropriation was anticipated in June 2021. After the appropriation was made the following year, in June 2022, PFAL resumed and updated the review by requesting publicly available documents in support of the Draft Funding Plan. These documents included, but were not limited to:

- California State statute and summaries of final budget package
- Authority business plans
- Project Risk Management Plan dated March 2017
- Project Risk Registers dated April 2022
- Enterprise Risk Management Policy dated August 2022
- Enterprise Risk Management Plan dated June 2022
- Authority's Project Management Plan, Rev 1.0 dated March 2021
- Construction Packages 1-4 contract documents
- 2022 Business Plan Basis of Capital Cost Estimate
- CA High-Speed Rail Authority, FY2022 Capital Outlay and Expenditure Report, July 2022 Report
- Finance & Audit Committee, Central Valley Status Report, July 2022 Report (data through May 2022)
- Confidence Reports for each CP dated June 2022
- Federal grant Cooperative Agreements as amended
- Bridging information from 2017 and 2021 Central Valley Segment Funding Plan scope and budget
- Finance and Audit Committee cash management and operations reports
- Litigation log
- Court rulings and decisions
- Funding sources and uses table dated July 2022
- 2021 Central Valley Project Financial Plan dated November 2021

PFAL initially reviewed a draft of the February 2021 Funding Plan when Prop 1A appropriation was anticipated in 2021. When our work was reactivated in 2022, PFAL reviewed an updated, internal working draft of the Funding Plan dated July 2022, an updated draft dated August 29, 2022, and the final version of the Funding Plan dated September 1, 2022. In addition to the Funding Plans, PFAL requested, received, and reviewed numerous supporting documents referenced in the Funding Plan to verify the underlying assumptions and statements included in the Funding Plan. After the



initial review of these documents, PFAL and its subconsultants undertook an iterative process to pose questions and requests for clarification to the Authority with the Authority providing additional supporting information and clarifications as needed.

To facilitate the process, document and question requests were categorized by:

- Civil
- Track and Systems
- Capital Costs
- Construction Schedule
- Environmental
- Project Management
- Risk Management
- Operations
- Rolling Stock
- Legislation/Project Agreements
- Funding

The additional information requests included, but were not limited to:

- Authority's Track and System Contract Documents
- Integrated schedule
- Funding plan schedule by fiscal year
- Bridging information from the 2017 and 2021 Central Valley Segment Funding Plans previously reviewed by PFAL
- Current costs, trends, risk contingency amounts by project component
- Estimated cost at completion and risk contingency for Track and Systems
- Risk Registers
- Program-level contingency
- Basis of cost estimate
- Third Party Agreements Report Summary
- Verification and Validation Management Plan
- Project & Construction Management Manual
- Updated Project Management Plan
- Funding source details and status updates
- Environmental commitment information
- Design and construction variance information
- Change order information
- Litigation information

The information was provided to PFAL by the Authority as it became available. As a result, the information requests were met at various stages of the review. As discussed in more detail in Section 6, the Authority made risk registers available for





PFAL review. The Authority provided Confidence (project status) Reports for CP 1-4 (that included risk registers), Board of Directors Update on Enterprise Risk Management (“ERM”) (April 2022), the Policy Summary for HSR ERM, and a draft version of the risk chapter from the 2021 Central Valley Project Financial Plan to be provided to FRA. The Authority also provided the final Central Valley Project Financial Plan (“CVPFP”) that qualitatively summarizes the top risks being tracked CP1-4. This document comprehensively identifies the top risks and provides prudent risk mitigation strategies for each CP. The sum of these individual components allowed PFAL to verify that the Authority is conducting ongoing risk assessments and that cost and schedule forecasts reflect the impacts of identified and potential future risks. These documents demonstrate that the Authority continues to develop risk registers that correlate with each phase of the project. The Authority has demonstrated that the magnitude of each risk is assessed periodically and that mitigation strategies are identified to respond to and manage project risks. Many risks are appropriately quantified according to a range of cost and schedule impacts (dollar values and time) and probability of occurrence. PFAL presumes the respective contingency values have been translated to the overall budget, and are consistent with the results of a P70 risk assessment. The Funding Plan indicates that in 2020, the Authority conducted an enhanced and robust risk assessment effort (P70), including Monte Carlo simulations, to identify and quantify discrete schedule and cost risks, as well as the uncertainties associated with the program scope. The Authority provided PFAL the risk assessment in aggregate form instead of by individual issue due to commercial negotiation concerns for existing contracts. The Authority should consider updating the 2020 risk assessment to capture changes that have since occurred, including construction schedule and procurement delays, increased escalation materials and labor rates, high number of change orders, nonconformances and others as captured by the risk registers. The Authority indicates that these items will be incorporated into the 2023 Project Update Report, as required by SB 198. While the ERM Policy and Plan documents were provided to PFAL for review, these documents more broadly address the Authority’s objective to foster a culture of risk management and awareness. Risk management strategies include the identification of key risks in the monthly Confidence Reports provided for each of the CP 1-4 project segments.

The project sources and uses funding plan was provided to PFAL by the Authority for the Segment.

Following review of the provided documentation, PFAL and their subconsultants developed a register of questions to the Authority to seek explanation and clarification on a number of items. To expedite the process of clarifying open issues, PFAL and the Authority conducted weekly meetings by teleconference for PFAL to report on open questions and to give the Authority an opportunity to respond with



supplemental information. The purpose of the meetings was to facilitate the understanding of the Funding Plan in a factual manner that would aid PFAL’s analysis.

As described above, the Authority provided PFAL with successive versions of the draft Funding Plans on specific dates from April 2021 to the final version dated September 1, 2022. The September 1, 2022 Funding Plan is the focus for this review.

PFAL’s original work commenced with a Task Order kick off conference call on March 8, 2021 and was reinitiated with a conference call on July 19, 2022, subsequent to the June 2022 passage of AB 180, which appropriated the remaining balance of \$4.2 billion in Prop 1A funds as highlighted further in this Report. Once the majority of supplemental information was provided and the initial draft Funding Plan was reviewed, the PFAL team and the Authority conducted teleconferences on April 29, 2021; May 28, 2021; June 25, 2021; August 2, 2022; August 12, 2022; August 29, 2022; and September 1, 2022 to provide an opportunity for the Authority to clarify potential issues identified by PFAL and to address any questions. The purpose of these teleconference calls was to provide factual clarifications and respond to questions raised by the PFAL team regarding how the Authority identifies and manages risk and to clarify cost reporting with the Authority’s Project Controls division. The outcomes of the teleconference calls have been incorporated into this Report.

The review of the documents and conversations as outlined above was limited to the scope of the Funding Plan for the purpose of this Report. PFAL’s scope of work was limited to reviewing the content of the Funding Plan and its supporting documentation and information. **This means PFAL did not review procurement of high-speed trainsets or the infrastructure projects required to connect the Segment to the rest of the high-speed rail system because they are not included in the Funding Plan.**

To formulate an opinion on SHC 2704.08(d)(2), PFAL’s Report is structured as set out in the following table.

*Table 3: Report Structure*

Report Section	Approach
Section 1	Summarizes PFAL’s approach and methodology
Section 2	Analyzes the constructability of CP 1-4 and the planned Track and Systems Contract by determining the reasonableness of the following items to formulate an opinion on SHC 2704.08(d)(2)(a): <ul style="list-style-type: none"> <li>scope</li> </ul>



Report Section	Approach
	<ul style="list-style-type: none"> <li>• procurement method</li> <li>• construction schedule</li> <li>• project management</li> <li>• project cost</li> <li>• funding</li> <li>• regulatory standings of the construction program</li> </ul>
Section 3	Provides a review of the Segment’s ability to function as a foundation for HSR while providing near-term benefit to passenger rail service to formulate an opinion on SHC 2704.08(d)(2)(b).
Section 4	Evaluates the ability of the San Joaquin Joint Powers Authority, HSR, or both, to operate in the corridor and to provide an opinion on SHC 2704.08(d)(2)(c).
Section 5	Addresses SHC 2704.08(d)(2)(d) and explains that because the scope of the Funding Plan does not include the stand-alone operations contemplated by SHC 2704.08(d)(2)(d), PFAL makes no findings on the matter of any operating subsidy.
Section 6	Reviews the Authority’s risk management plans for the Segment to form an opinion on SHC 2704.08(d)(2)(e).

## 1.2 PROPOSITION 1A FUNDING

In April 2012, the Authority published their 2012 Business Plan that outlined a phased implementation approach to reach HSR operations. The phased implementation included early investments in the Segment that would later connect to what the 2012 Business Plan defined as the Initial Operating Segments (“IOS”). The IOS-North and IOS-South would ultimately be parts of the Phase 1 System, which would enable high-speed rail operations from San Francisco to Los Angeles and Anaheim<sup>1</sup>. The 2016 Business Plan and 2017 Central Valley Segment Funding Plan described the Authority’s plan to start its service on what is referred to the Silicon Valley to Central Valley Line which is similar to the IOS-North from the 2012 Business Plan.

In July 2012, SB 1029 appropriated \$2.609 billion of Prop 1A bond proceeds for the “Initial Operating Segment of the High-Speed Rail System”. The current Funding Plan addresses an additional \$4.2 billion of Prop 1A bond proceeds that were appropriated by the California State legislature under AB 180 to complete the Segment.

<sup>1</sup> The IOS-North and IOS-South overlap in the Central Valley. The Segment is the northmost segment of IOS-South and the southmost segment of IOS-North.



The Authority’s general counsel has confirmed that the Segment is eligible to receive Prop 1A funding. Counsel confirmed that AB 1889, enacted in 2016, clarifies that early investments in “bookend” projects and elsewhere along the system– as defined in SB 1029 of the 2011–12 Regular Session (Chapter 152 of the Statutes of 2012) – which will ultimately be used by high-speed rail trains, are consistent with the intent of the Legislature in appropriating funding and are consistent with Proposition 1A. Counsel also provided a May 2019 California Superior Court ruling which included confirmation that AB 1889 is a valid legislative enactment. Counsel therefore determined the Segment meets the requirements to qualify as a segment that is “suitable and ready for high-speed train operation”.

PFAL notes that prior to implementation of high-speed passenger service by the Authority, the Segment is expected to be used for interim high-speed rail service provided by the San Joaquin Joint Powers Authority. As described in the Funding Plan, the Authority has in place an Interim Service Plan MOU with the San Joaquin Joint Powers Authority and California State Transportation Authority that, among other things, sets out a plan to coordinate rail services and capitalize on efficiencies between the ACE, San Joaquins, and eventual HSR passenger services on the Segment.

### **1.3 SUBJECT OF FUNDING PLAN**

The usable segment as defined in the Funding Plan is the Segment. The geographical boundaries of the approximately 119-mile Segment are from the northern point in CP 1 near Madera Amtrak Station to the southern point in CP 4 near Poplar Avenue as seen in Figure 1.



Figure 1: CP 1-4 Map<sup>2</sup>

The Segment is predominantly a “greenfield”<sup>3</sup> project with the civil work currently under construction. The Segment will serve as a foundation for future high-speed rail operations once it is connected to the planned Silicon Valley to Central Valley Line. Prior to connecting to the Silicon Valley to Central Valley Line, the Authority will not operate stand-alone service on the Segment but plans to eventually use it as a test track prior to HSR operations. We understand that it is a federal requirement to test operations prior to commencement of service. The Segment will also be used for high-speed regional rail services operated by others as described above.

The civil, track and system elements included in the Funding Plan are shown in Table 3. High-speed trainsets that the Authority intends to procure are not included in this Funding Plan and are not a subject of PFAL’s review.

<sup>2</sup> Source: <http://www.hsr.ca.gov/Programs/Construction/index.html>

<sup>3</sup> A greenfield project typically refers to a project with no historic demand in the project location



Table 4: Segment Funding Plan Construction Elements<sup>4</sup>

Funding Plan Element	Scope	Procurement
SR99	<ul style="list-style-type: none"> <li>Realignment of 2 miles of SR99 in Fresno</li> </ul>	<ul style="list-style-type: none"> <li>Partnership with Caltrans. Construction completed.</li> </ul>
CP 1	<ul style="list-style-type: none"> <li>32-mile stretch from Avenue 19 in Madera to East American Avenue in Fresno</li> <li>20 grade separations, 2 viaducts, 1 tunnel and river crossing</li> </ul>	<ul style="list-style-type: none"> <li>Executed Design-Build (“DB”) contract in August 2013.</li> <li>Approximately 65.1% complete as of June 30, 2022, as reported in the Central Valley Status Report.</li> <li>Based on the Funding Plan, CP 1 is scheduled for completion in 2025 based on Authority forecasts (subject to revision with the 2023 Project Update Report).</li> </ul>
CP 2-3	<ul style="list-style-type: none"> <li>65-mile stretch from East American Avenue to north of Tulare-Kern County Line</li> <li>36 grade separations, viaducts, underpasses, and overpasses</li> </ul>	<ul style="list-style-type: none"> <li>Executed DB contract in June 2015.</li> <li>Approximately 66.8% complete as of June 30, 2022, as reported in the Central Valley Status Report.</li> <li>Based on the Funding Plan, CP 2-3 is scheduled for completion in 2025 based on Authority forecasts, (subject to revision with the 2023 Project Update Report).</li> </ul>
CP 4	<ul style="list-style-type: none"> <li>22-mile stretch from Tulare-Kern County Line to Poplar Ave.</li> <li>construction of at-grade, retained fill and aerial sections of HSR alignment and relocation of four miles of BNSF track</li> </ul>	<ul style="list-style-type: none"> <li>Executed DB contract in February 2016.</li> <li>Approximately 80.6 % complete as of June 2022, as reported in the Central Valley Status Report.</li> </ul>
Track	<ul style="list-style-type: none"> <li>Rails, fasteners, ties and interlockings required to allow operation of one train per hour, per direction on the Segment. Trackwork will be provided to allow future implementation of the full track system with limited disruption to ongoing train operations.</li> </ul>	<ul style="list-style-type: none"> <li>To be procured under one long term Track and Systems Provider contract. Contractor selection for track, railroad infrastructure, Signals and communications and traction power is anticipated by the end of 2022.</li> </ul>

<sup>4</sup> Data from “Central Valley Status Report, data as of June 20, 2022. Percentage completed is actual cost divided by EAC for each Civil contract along with other qualitative and quantitative independent analysis of the respective schedule risks as identified in each of the confidence reports.



Funding Plan Element	Scope	Procurement
Railroad Infrastructure	<ul style="list-style-type: none"> <li>The additional infrastructure and any modifications to that provided under CP 1 to CP 4 (or other civil contracts) required for the safe and efficient installation of the rail track</li> </ul>	<ul style="list-style-type: none"> <li>To be procured under one long-term Track and Systems Provider contract. Contractor selection is anticipated by the end of 2022.</li> </ul>
Signaling and Communications System	<ul style="list-style-type: none"> <li>The technology and software required for the safe and efficient operations of one train per hour per direction and the maintenance of rolling stock that meets PTC requirements, and the operations control center equipment and train/wayside communications. Future enhancement of the signaling and communication system to support full high-speed train operations will be possible with some disruption to ongoing train operations.</li> </ul>	<ul style="list-style-type: none"> <li>To be procured under one long-term Track and Systems Provider contract. The Track and Systems procurement schedule has slipped approximately 1 year since summer of 2021.</li> </ul>
Traction Power System	<ul style="list-style-type: none"> <li>The electrical substations and overhead contact system required to enable one train per hour per direction to operate safely and efficiently. Future expansion of the traction power system to support full high speed train operations will be possible. Disruption to ongoing train operations will be dependent upon the desired increase in service levels and the timeframe over which increased service is implemented.</li> </ul>	<ul style="list-style-type: none"> <li>To be procured under one long term Track and Systems Provider contract.</li> </ul>

Completion of the scope of work proposed in the Funding Plan will provide tracks, electrification, signaling, train control and communication systems and a control center that will allow high-speed trains to be operated in the corridor. Additional investments (such as acquisition of high-speed trainsets) that are not part of the Central Valley Project scope will be required to carry passengers at intended high speed on the corridor. These additional investments are not contemplated in this Funding Plan and are therefore not a subject of PFAL’s review under this Report, but we note that these expenditures will need to be made prior to initiation of the Authority’s high-speed passenger service. We note that the Authority is pursuing over \$4.8 billion in federal grant funding newly available under the Bipartisan Infrastructure Law for these required improvements.



Further description and analysis of the constructability of these Funding Plan elements is provided in Section 2 of this Report.

## 1.4 USE OF PROP 1A FUNDS

This Funding Plan pertains to the \$4.2 billion of Prop 1A bond proceeds for the Segment that were appropriated by the California legislature in AB 180 and further clarified in SB 198. We have reviewed the language in these bills and note that the legislature has introduced new reporting and oversight requirements in SB 198. SB 198 requires the Authority to include in the 2023 Project Update Report an updated funding plan for the entire Merced to Bakersfield segment, including new estimates of cost and schedule for the Central Valley Segment subsection. Of the \$4.2 billion appropriated by AB 180, SB 198 specifies that the final \$2.2 billion is available for expenditure only after the 2023 Project Update Report is provided and a 60-day review period occurs. PFAL notes that our findings assume that these funds will be made available and deployed as described in the Funding Plan.

A complete description of the sources and uses of funds for the Funding Plan is discussed in Section 2.6. As shown in the Authority’s Sources & Uses Plan (reflecting assumptions from August 2022<sup>5</sup> and summarized in Table 5, \$2.6 billion of Prop 1A funds have been distributed to date and \$4.2 billion is expected to be fully expended by FY24-25.

Table 5: Segment Use of Prop 1A Funds<sup>6</sup>

Fiscal Year (YOE \$000')	FY21-22	FY22-23	FY23-24	FY24-25
<b>Prop 1A Yearly Expenditures</b>	-	1,771	1,850	579
<b>Cumulative Total Expenditures</b>	2,609	4,446	6,081	6,808

Note: Yearly expenditures total may not foot with Cumulative Total Expenditures due to rounding.

<sup>5</sup> Information included in the Sources & Uses Plan included in Funding source: August 2022 Capital Outlay Report with C&T auction results through August 2022.

<sup>6</sup> Central Valley Segment – Sources & Uses Analysis – August 2022 Update. California High Speed Rail Authority. September 2022.





Prop 1A bond proceeds will fund various components of the Funding Plan scope of work, but will primarily fund site work, track and track structure. The uses of all funds, including Prop 1A in FY 22-23, 23-24 and 24-25 are shown in Table 6.

Table 6: Segment Uses of Funds

Item	Total Budget (\$M)
CP 1 + SR-99	\$5.133
CP 2-3	\$3.836
CP 4	\$1.208
Segment Track, Systems, Stations and Support Facilities	\$2.362
Program-wide Support	\$687
Interim Use / Project Reserve	\$208
Program Wide Contingency and Reserves	\$420
<b>Total (Rounded)</b>	<b>\$13.855</b>

The above tables are indicative and may change depending upon demand, given that there are no yearly maximum or minimum thresholds set out by the Authority.

As outlined in Section D of the Funding Plan, Prop 1A bonds will be subject to a typical process for the sale of general obligation (“GO”) bonds. This includes the development of a biannual bond survey submitted to the Department of Finance. The Authority’s cash flow projections are then submitted to the State Treasurer’s Office through the Department of Finance to be included in the State’s GO bond issuance. The Authority does not assume debt service payment risk.

## 2. Constructability

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Having completed a review of all requested documentation, we have concluded that construction of the Segment can be completed as proposed in the Funding Plan, as specified, and in compliance with environmental documents, continued and successful implementation of the enterprise risk management program, continued successful implementation of risk assessment and mitigation activities for active and future construction contracts, and the successful award of the Track and Systems contract as planned.

Most of the work (in terms of contract value) described in the Funding Plan is under contract. Construction contracts for CP 1-4 represent \$6.405 billion of the \$13.855 billion total cost for the Central Valley Segment. These contracts are about 53% complete, overall. In 2016 the projected total cost for the civil construction work was \$3.214 billion. The Authority has informed us that projected costs for this work have more than doubled primarily due to conflicts with utilities and other third parties, delays in acquiring right of way for construction, and design changes necessitated by changing requirements of the affected railroads, utility companies and municipalities.

In 2016 the Authority forecast completion of CP 1-4 in August 2019. The 2022 Funding Plan forecasts completion of CP 1 and CP 2-3 in 2025 and the completion of CP 4 in May 2023.

The completion of the civil works has been delayed due to the issues that caused significant cost increases. We are aware that the contractors of these segments have forecast potential completion dates that extend beyond the Authority's forecasts, and we understand that the Authority intends to continue negotiations with the contractors to facilitate meeting the timelines described above.

Although additional right-of-way is being acquired for relocation of utilities, a large portion of the right-of-way, third party, utility and design risks that led to significant cost increases for and delays of CP 1-4 have been realized and reflected in the current cost estimates and schedules. The current budgets and schedules for the ongoing civil work include cost and schedule contingencies (reflecting a 70% confidence level) and were based on formal risk assessments conducted by the Authority.

The selected provider for the Track and Systems Contract ("TSC") will be installing equipment on facilities constructed by the civil contractors. Although remaining utilities and third-party conflicts appear to be less significant, delays continue to accumulate. The top construction risks identified by the Authority for the TSC include interface risks between the civil works contracts and the track and systems work, including the risk of delayed turnover of work areas to the track and systems



contractor. High risks for the TSC also include market risks that could impact the pricing of the work and the availability of required materials and labor. The current budget for the work includes cost contingency reflecting a 70% level of confidence based on identified design and construction risks as well as a range for the anticipated final award price, which is intended to reflect market risks. Reevaluation of risk components as related to escalation and the continued CP 1-4 schedule delays would be a prudent measure to determine a realistic project cost and Central Valley completion date. The Authority is assembling the 2023 Project Update Report to incorporate these items.

The schedule previously reflected completion of the TSC in 2028, assuming contract notice to proceed in early 2022, which would have provided more than six years for completion of design, construction, testing, and commissioning. This forecast for contract completion in 2028 may not be feasible based on the revised contract award date in late 2022 and contract commencement in early 2023. The preceding civil work contracts may not be sufficiently completed in time to avoid delays to the TSC. The complexity of the work and the long-term nature of the TSC introduces challenges to select the team and negotiate contract terms and conditions over the timeframe that is currently programmed.

The Authority has enhanced its contract monitoring and control systems, implemented risk-based methods to establish schedule and cost contingencies and has made significant progress implementing ERM program based on lessons learned from the management of CP 1-4. In PFAL's opinion, the contract monitoring, control, and risk assessment processes now being used by the Authority are appropriate for the scale and complexity of the Segment program.

Given the current scope of work, the significant increases in materials and labor escalation, significant schedule delays and other status as reported by the Authority, we encourage The Authority to validate that the cost and schedule forecasts for the Segment are realistic and achievable. In the 2022 Funding Plan, the Authority reports that the schedule will be re-baselined, and project costs updated as part of 2023 project update efforts. PFAL believes that these prudent measures could result in an achievable cost and schedule for the project. The 2022 Funding Plan indicates that itemizing escalation cost is not currently possible. However, future Cap and Trade Funding will be available to fill any budget gaps if they occur and additional federal funding is being sought by the Authority. Based on the actions as prescribed above, it is reasonable to assume that the Segment can be constructed to serve the purposes indicated in the updated funding and business plans.

Our more detailed assessment on each of these items is provided below.



## 2.1 PROCUREMENT

### 2.1.1 CP 1-4

The civil works for the Central Valley segment have been procured using DB contracts denoted as CP. Three contracts have been executed:

- CP 1 – awarded 8/16/2013, with initial Notice to Proceed (“NTP”) 10/15/2013<sup>7</sup>
- CP 2/3 – awarded 6/10/2015, with NTP 7/25/2015<sup>8</sup>
- CP 4 – awarded 2/29/2016, with NTP 4/15/2016<sup>9</sup>

CP 1 was awarded to the joint venture of Tutor Perini/Zachry/Parsons for \$985.1 million, with other four other bidders’ proposed prices ranging from \$1,085 million to \$1,537 million. CP 2-3 was awarded to the joint venture of Dragados/Flatiron/Shimmik for \$1,234.6 million, with two competing prices of \$1,740 million and \$2,066 million. CP 4 was awarded to California Rail Builders for \$347.6 million, with three other responsive proposals ranging in price from \$377.1 million to \$581.9 million. The contracts were awarded through a competitive process that included extensive industry outreach. The Authority reported that the contract award amounts were below the engineer’s estimate for each contract.

Each of the DB contracts is managed by a consultant Project Construction Management (“PCM”) firm. Contracts for Construction Management services were procured through a competitive process for each CP. The procedures and methods to be applied by the CM teams are documented in a Construction Management Manual.

Costs have increased and schedules extended for all three civil contracts. Executed change orders for each contract through June 2022 include:

- CP 1 - \$1,772.44M million (173% of original contract value)
- CP 2-3 - \$1,060.6 million (78%)
- CP 4 - \$262.5 million (59.1%)

In addition to civil works for High-Speed Rail, implementation of the Central Valley segment requires relocation of a portion of State Route 99 (“SR 99”) in the CP 1

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<sup>7</sup> Central Valley Status Report January 2021 data.

<sup>8</sup> Central Valley Status Report January 2021 data.

<sup>9</sup> Central Valley Status Report January 2021 data.

segment of the project through an agreement between Caltrans and the Authority that was executed in February 2013<sup>10</sup>. A Construction Manager/General Contractor (“CM/GC”) contract with Granite Construction was used to complete the relocation work. The Authority funded this work through an interagency agreement in the amount of \$296 million. The contract was divided into an early work package and a main package. The NTP for the main package was issued in August 2016. Work is complete and the construction contract is being closed out.

As with any significant infrastructure project with more than one contract, interfaces among these civil works contracts and between the civil works and the follow-on rail infrastructure and the other elements of work must be effectively managed by the Authority to successfully deliver the Central Valley segment. These interfaces represent risks that could impact the cost and delivery schedule for the work, as discussed in Section 2.1.2. The Authority recognizes and is actively managing the interfaces and tracking the related risks in its program-level risk register.

### **2.1.2 Track and Systems Elements**

The project delivery model chosen by the Authority uses the TSC to deliver, manage and maintain all the trackwork and the high-speed rail technology systems except for the passenger rolling stock. The TSC will also have major systems integration and very broad responsibilities which include<sup>11</sup>:

- Acting as the systems integrator for the rail infrastructure and the existing CP 1 through CP 4 civil works contracts as well as future civil works contracts that are needed to complete the high-speed rail network
- Acting as the systems integrator for the interfaces between the passenger rolling stock and the train control and communications systems
- Operating the Rail Infrastructure System, including dispatching trains
- Maintaining all the physical and technology rail infrastructure over a 30-year contract, and retaining operations and maintenance records for the HSR system
- Building station platforms
- Ensuring that the base civil works are “fit for purpose” and making corrections when appropriate

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<sup>10</sup> Finance and Audit Report, State Route 99 Alignment, Contract HSR 12-06, CHSR, November 2016.

<sup>11</sup> Track and System Functional and Technical Requirements, Industry Draft California High-Speed Rail System. May 9, 2019.



The TSC is at the center of the entire high-speed rail system and the scope and responsibilities are significant, although in line with how other HSR systems around the world have been successfully implemented. The TSC is being procured through a two-step process including a Request for Qualifications (“RFQ”) phase and an RFP phase. The RFQ was released in July 2019 and Qualifications Statements were received in November 2019. Three teams were short-listed, and RFPs were issued in December 2019. One of the short-listed teams withdrew from the competition in February 2020. COVID-19 and other factors have impacted the procurement process and proposals due from the two remaining teams in October 2022. The Authority’s high level program schedule previously assumed that NTP will be issued to the selected contractor team in early 2022. Current plans indicate contract award in early 2023.

Consistent with the industry-accepted DB model, the Functional and Technical Requirements for the contract describe the desired outcomes for the contract, rather than prescriptive requirements for how the work must be done. This places a higher burden on TSC competitors to fully define their approach during the proposal process. The use of output and performance-based specifications reflects current best practices because this approach allows the contractor to propose the most cost-effective designs and technologies. Increased challenges and risks associated with delivery of the TSC arise because of the delayed CP 1-4 civil contracts. Higher than normal escalation costs and the need for increased coordination required between the TSC Contractor and Civil Contractors will be required and will need to be closely monitored by the Authority to avoid cost increases, schedule delays, and potential for disputes. The Authority is incorporating these items into the ERM process to verify whether remaining contingency amounts are adequate to implement the TSC.

As the Segment construction proceeds, there will need to be more definitive information on the prospective TSC interfaces with the CP 1 through CP 4 civil works contracts – and how TSC contractors need to interface with those civil works contracts. Interdisciplinary reviews and the modeling of track and other systems components are recommended to verify that all project elements fit within the available construction envelope. This would include physical space requirements to perform the maintenance of way for elements such as ballast, track, signal, power and other components as needed.

The PFAL team has reviewed some of the key contract terms and conditions and the processes and procedures being used by the Authority to procure the TSC. Sensitive commercial information that could compromise the procurement was appropriately withheld by the Authority. Those procedures can be effective assuming that the Authority will maintain knowledgeable and experienced resources to oversee and manage the necessary interfaces, notwithstanding the fact that they are contractually



the responsibility of the TSC. Although the Track and Systems contract will be a major infrastructure procurement that will require the Authority to further develop its procurement and management approach, the results of our reviews indicate that the Authority is taking the necessary steps to successfully award and manage this contract. Deployment of the ERM Program is a prudent step to maintain effective risk management practices. The ERM Program should enhance the Authority’s ability to maintain adequate contingency amounts according to the actual level of risk to which the project is subjected during ongoing project construction. We see no technical issues that if managed properly will prevent successful delivery of the Track and Systems contract. If the Authority continues to implement the proper risk management and technical management skillsets, we believe that the infrastructure can be built as described in the Funding Plan.

## 2.2 SCHEDULE

### 2.2.1 CP 1-4

The schedule for the awarded construction packages and future work was summarized in the Authority’s 2022 Draft Funding Plan. The construction work associated with each contract is represented by a single activity in this high-level schedule. There is therefore less detail shown in this schedule and few logic ties to the ongoing right-of-way acquisition work that are needed to support utility relocation. Confidence Reports issued for each of the civil construction contracts provide status updates, issue identification and tracking, and risk assessments that indicate that the logic ties between the construction work, right-of-way acquisition and work by third parties (such as utility relocations) are being tracked through critical path scheduling methods for each contract.

The end dates for the active construction packages presented in the Funding Plan summary do not appear to include schedule float sufficient to address schedule risks that have been identified for each contract. The table below shows the Authority’s current forecasted contract completion dates and the risk-adjusted completion dates from the Confidence Reports and the completion dates shown in the summary schedule.

Table 7: Projected Contract Completion Dates

Contract	Funding Plan Completion Date
CP 1	2025
CP 2-3	2025
CP 4	March 2023



### 2.2.2 Track and Systems Elements

The Authority has conducted extensive industry outreach on the TSC procurement, has completed the Qualifications stage of the procurement and is near the end of the Proposal stage, with proposals from two qualified teams due in October 2022. Given the complex nature of the scope of work, and the 30-year term of the contract, evaluation of the proposals could take an extended time. The program schedule shows contract award in early 2023. Furthermore, given the scope and complexity of the contract, the Authority has included most of the terms, conditions, scope, indemnities, and payment schedule in the RFP. The current schedule assumes contract notice to proceed in early 2023, which may be optimistic, although phased notices to proceed and a well-developed contract provided as part of the solicitation help to reduce the need for extended, more complex negotiations on the contract.

The Authority provided a draft payment milestone schedule for the TSC. The summary level of information provided to PFAL does not accommodate a comprehensive analysis to determine if the milestone dates include sufficient schedule float. The contract duration of 2708 days to deliver Segment 1 appears reasonable, assuming that the Track and Systems work is not impeded by delays to predecessor work (CP 1-4). The current schedule assumes contract notice to proceed in early 2023. The contract includes phased notices to proceed (including four phases for the first 119 miles), a milestone-payment framework, and detailed indices and escalation provisions to address the current market and long-term nature of the contract. The four phased notices to proceed include: NTP1A.1 for design and mobilization; NTP1A.2 for early works that include construction of maintenance of way facilities (MOWF), traction control facilities (TCF), and operations command center (OCC); NTP1A.3 for placing orders for long lead items including rail and ballast; and NTP1A.4 for construction, testing, and certification. Under the terms of the proposed contract, the selected contractor will develop its own schedule to comply with the contract performance period included in the final negotiated contract. The draft milestone schedule indicates general durations for major elements of the contract which PFAL finds reasonable. The revised deadline for the FRA scope of work was previously the end of 2026. The milestone schedule indicated that installation work will be complete and traction power energized at the end of August 2026. This would have provided about four months of float to meet the FRA required completion date, which is less than 7% of the 60-month duration from NTP to installation completion. Because the contract award timing has slipped, PFAL presumes the dates will be revised to reflect the delay. Schedule slippages reported through the CP 1-CP 4 Confidence Reports dictate that there is a need to revise task and completion dates to match project logic and sequence as dictated by the progress of CP 1- CP 4. The interfaces between completion of the civil works and the start of TSC construction generate the top risks identified by the Authority for the TSC. PFAL encourages the Authority to develop an integrated program schedule with





logic ties between the civil works contract packages and the Track and Systems package so that the relevant interfaces can be monitored and controlled to avoid delays to Track and Systems construction and increased costs.

With the award to the selected TSC, it will be necessary to re-examine the overall schedule to minimize risks of schedule delays and increased costs. Specific interface challenges and risks associated with the civil works and Track and Systems work should be identified, quantified, and tracked. The selected contractor will produce a detailed baseline schedule within 50 days, and it is presumed that the contractor will include float in its schedule to address known project risks as well as unknown conditions and events that could impact design and construction. Once this schedule is approved, an integrated program schedule should be prepared and maintained as part of the Authority's monitoring and control system. PFAL understands that the 2023 Project Update Report will incorporate the associated cost and schedule revisions.

## 2.3 PROJECT MANAGEMENT

### 2.3.1 CP 1-4

The Authority provided PFAL with the PMP dated December 2020 and Rev 1.0 dated March 2021, the latest versions of the Program Management Plan ("PMP") for the high-speed rail program. Upon review, PFAL concludes that the document demonstrates comprehensive high-level management capacity applicable to the overall HSR Program. The PMP is a high-level document that addresses the overall high-speed rail program without details regarding the planned approach to managing specific projects within the program. The PMP includes references to appropriate supporting documents, including Quality, Safety and Security, and Risk management procedures. In lieu of these plans, PFAL has reviewed CP 1-4 confidence reports to draw conclusions regarding HSR management capacity. These reports effectively demonstrate improved monitoring processes and procedures over those outlined during previous management reviews performed by PFAL. PFAL notes that the newly established ERM program is developing consistent risk processes, policy and procedures across the CP 1-4 Civil Construction Contracts. Updated and corridor specific Project Management Plans remain crucial to the effective monitoring and control of major projects and programs. PFAL continues to recommend that these PMPs be developed or updated by the project teams and performance be monitored by the Authority as the program advances. Updates to the PMP are particularly critical prior to award of the TSC and should incorporate functions of the ERM. Risk impacts associated with materials, labor rates and availability of skilled labor should be quantified and reflected in the updated project plans, along with the 2023 Project



Update Report. We understand that it is the intent of the Authority to integrate lessons learned and risk mitigation measures in to the TSC.

The PMP does provide details with respect to roles and responsibilities but does not offer updated or detailed organization charts. PFAL reviewed the integrated organization chart, updated April 20, 2021, provided as a separate stand-alone document. The PMP was found to be comprehensive and detailed. A sequential list of approval signatures for this and previous versions were not included with the PMP. These are typically provided to demonstrate chronological review, approval/acceptance of each version throughout the life of the program. While we observe a positive trend in filling positions with HSR staff, PFAL is concerned about the relatively high number of vacant positions. The already tight labor market combined with escalating labor prices results in high potential risk to remaining project delivery tasks. PFAL recommends that the Authority develop an effective recruiting plan to fill vacant positions according to program delivery plans. The Authority should continue to quantify, monitor, and mitigate risk through its comprehensive risk registers and the RCMP.

PFAL reviewed the Quality MANUAL\_1000 (Master Quality Plan), dated April 2020. The Plan effectively summarizes high-level quality goals, quality processes and procedures and overall mission. It focuses on planning and design phases, with minimal details provided. It does not cover construction related items, particularly those that demonstrate how the Authority will assure that quality products will result from effective and efficient contractor quality control programs. It is expected that these quality plans would provide details related to configuration management, traceability, accountability, interdisciplinary reviews, and checklist information.

Cost control has been a challenge for the Authority through all of the construction packages, primarily due to delays in securing necessary right-of-way from the start of construction. For example, the contract value for CP 1 has more than doubled from the award price, reflecting an increased scope due to the extension of the work to Madera, the addition of extensive unanticipated utility coordination and relocation work and the costs associated with delays due to right-of-way acquisition issues.

The Authority's current management systems and planned enhancements are adequate to monitor and control the delivery of the scope of the Segment. Additional management reporting will need to be provided to address the full scope of work and the Authority appears to be planning to develop an industry standard project reporting capability with its plans for a PMIS and updates to the PMP.

## 2.4 REGULATORY STANDING

The regulatory and environmental review focused on the FEIR / FEIS documents, applicable records of decision (“RODs”), and the design build (DB) contracts and associated documentation describing the projects and the design builders’ progress. The focus is on the Central Valley sections of the project (CP 1, CP 2-3, and CP 4).

The FEIR / FEIS for the Merced to Fresno Central Valley section was published in 2012. The Federal Railroad Administration issued its ROD on September 18, 2012. The ROD selected the “Hybrid Alternative, Merced Downtown Station, and Fresno Mariposa Street Station” for the Project because the hybrid (1) “best [satisfies] the Purpose, Need, and Objectives” and (2) minimizes “impacts on the natural and human environment by utilizing an existing transportation corridor where practicable and incorporating other mitigation measures.”<sup>12</sup>

The FEIR / FEIS for the Fresno to Bakersfield section was published in April 2014. The Federal Railroad Administration issued its ROD on June 27, 2014. The FRA via the ROD selected “portions of the BNSF Alternative with the Corcoran Bypass, Allensworth Bypass, and Bakersfield Hybrid alternatives.” The Project also includes “the Kings / Tulare regional Station – East Alternative and the Downtown Bakersfield Hybrid Station Alternative.” FRA did not select a Heavy Maintenance Facility alternative at the time of the ROD. The ROD states that these alternatives (1) “best satisfy the Purpose, Need, and Objectives” and (2) “minimize impacts on the natural and human environment by utilizing an existing transportation corridor where practicable and incorporating other mitigation measures.”<sup>13</sup>

The ROD, thus, imposes specific environmental and regulatory requirements on the Authority and the three design / build contractors.

The Authority, in turn, assumed specific responsibilities based on the ROD and its associated documents when it entered into DB agreements for CP 1, CP 2-3, and CP 4. These responsibilities, spelled out in the Special Provisions, included:

- For CP 1, per Part A.2, section 2, tiered NTPs that defined the completion deadlines (NTP 1, 2, and 3) allowed for escalation according to a specified formula and an allowance after 360 days for a negotiated change order and time adjustment that accounted for environmental, regulatory, and other requirements and contingencies.

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<sup>12</sup> FRA ROD, p.41

<sup>13</sup> FRA ROD, p.43

- For CP 2-3 and CP 4, per Special Provisions 2.0 and 3.0, Notices to Proceed that, in turn, defined completion deadlines were specified, allowing for escalation according to a specified formula, as well as an allowance after 360 days for a negotiated change order and time adjustment that accounted for environmental, regulatory, and other requirements and contingencies.
- Substantial Completion for CP 1 was set at 51.5 months after NTP-1 (January 2018) with the Final Acceptance Deadline defined as 53.5 months after NTP-1 (March 2018). CP 2/3 allowed 980 days after NTP for substantial completion (March 2018) and 1025 days for Final Acceptance (May 2018). CP 4 allowed 740 days after NTP for substantial completion (April 2018) and 785 days for Final Acceptance (June 2018). The substantial completion dates and contract durations have been significantly changed because of delays caused by delayed acquisition of right-of-way, design changes, unanticipated utility conflicts and requirements from third parties. CP 4 is forecast by the Authority to be substantially complete in March of 2023 (more than five years later than planned), CP 1 is forecast to be complete in 2025 and CP 2-3 is forecast to be complete 2025, more than six years later than planned.
- Contract CP 1 was signed with the Merced to Fresno section environmental documents already complete and covered by the FRA's ROD and other decision documents referenced in section 8.1. CP 2-3 and CP 4 were also tied to the Fresno to Bakersfield FEIR / EIS and its FRA Record of Decision of June 2014.
- All three DB contracts (in their Special Provisions) include specific allocations of responsibility for obtaining government approvals. Per these Special Provisions, the Authority committed to beginning "to implement all off-site mitigation measures ... as necessary to allow impacts to resources subject to ... Governmental Approvals to proceed in compliance with applicable Laws." [quote extracted from Special Provision 6.1.1 for CP 2-3, with similar language included in CP 1 and CP 4]
- CP 2-3 and CP 4 included a specific reference to the Authority's Environmental Mitigation Management and Assessment ("EMMA") database to document compliance with all Environmental Requirements. The Authority required the CP 1 contractor, post-contract execution but consistent with the terms of the contract, to use EMMA. All three contracts include reference and required compliance with the Mitigation Monitoring and Enforcement Plan ("MMEP").
- The Authority's CP 1, CP 2-3, and CP 4 agreements appear to have addressed the environmental and regulatory requirements in an inclusive manner that links contractor requirements and the Authority's own requirements. The risks associated with achieving the commitments appear to be normal project risks that can be managed by EMMA and MMEP. Future contracts (after CP 4) should carry references to both EMMA and MMEP.

However, the Authority's obligations to obtain approvals and permits on a specific time frame imposes performance, cost, and schedule risks. Because CP 1 was the earliest contract, the Authority's exposure to cost and schedule risks were the greatest in relation to this contractor. The impact of those risks may have been eclipsed by the impact of right of way and third-party agreements after CP 1 started



work. Nonetheless, the schedule impacts have contributed to the overall delay and extension of the CP 1 contractor's work. CP 2-3 and 4 are also experiencing significant delays. As a mitigation measure, the Authority should follow the model used in CP 4 that provides a more complete set of references to EMMA and to MMEP for future contracts. Additionally, schedule provisions for future contractors should continue to include adequate time allowances for the Authority's efforts to meet environmental and regulatory commitments. PFAL anticipates that revisions to schedule and cost data resulting from the 2023 Project Update will consistently be incorporated into the project management planning documents.

The Heavy Maintenance Facility ("HMF") was addressed in both FEIR / EISs for the Central Valley. However, the HMF was not included in the ROD. The future contract that will include the HMF should include any additional or new environmental commitments that may be imposed via a future FRA ROD or by CEQA.

The Authority's environmental documents included obligations with which it and its contractors comply. However, these obligations appear to be well managed and none of the obligations would appear to pose any serious issues for the Central Valley segment to be built as planned. PFAL reviewed the Project Commitment Audit Final Report (dated August 2022) and concludes that findings from the audit committee are being incorporated into the environmental mitigation plans. Although environmental tracking logs were not available for PFAL review, we have assumed based on discussion with the Authority that commitments are being met. We observe that litigation against the project is being tracked.

## 2.5 CONSTRUCTION COST

### 2.5.1 CP 1-4

As of June 2022, the total budgeted construction cost for the civil works for the Central Valley segment was \$13.876 billion, about 160% higher than the \$5.329 billion budgeted for this work in 2016. Of the total amount, \$7.911 billion, or 57%, was for the budgeted construction contracts including remaining construction contingency. The remaining \$5.965 billion in budgeted costs included right-of-way acquisition, construction management, and work by third parties, including \$296 million for the realignment of SR 99 by Caltrans. Total contingency for the three active construction contracts was \$1.1 billion, as of June 30, 2022. The contingency was comprised of \$728.6 million for identified potential contract changes and \$406.7



million in contingency to account for remaining project cost risk at the 70% confidence level.<sup>14</sup>

Expenditures to date for the DB construction work as of June 2022 totaled \$4.028 billion or 68% of the current contract amount and 60% of the EAC for the three contracts. The remaining contract amount to complete the civil works was \$1.918 billion and the remaining work including anticipated contract changes was about \$2.642 billion. The total available contingency represented about 28% of the expected \$2.642 billion in contract work that remained to be completed. This very high contingency reflected high anticipated costs for already identified contract changes. The contingency allocated for the active construction contracts was well above the industry-standard 10% for work that is under construction, which is warranted given the history of cost increases due to scope changes, changing requirements of affected third parties and schedule delays. In addition to the contingency amounts for contract work, the civil works budget included \$244 million in contingency for construction management, right-of-way and third-party costs, which provided an additional level of confidence that the civil works can be completed within the identified budget. Based on the EAC amounts and contract completion dates reported in the June 2022 CPs 1-4 Confidence Reports, PFAL identified risks with respective contingency amounts to evaluate the adequacy of budget amounts indicated in the 2022 Funding Plan. Since the Authority is required to update the budget and re-baseline the schedule with its 2023 Project Update Report, that would be an opportune time to confirm construction EAC amounts and a realistic budget to complete the Segment. Furthermore, the bid amount may soon become available for the final major construction project (TSC) and the significant market risk impacts could become more quantifiable. ERM should reassess risks based on current project conditions. It is reasonable to assume that additional funding could be needed to complete the Segment. Given the Authority's ability to make use of Cap-and-Trade funds to cover any potential cost overruns and its aggressive pursuit of federal grant funds, it is reasonable to assume that the Segment can be delivered according to the functionality proposed in the Funding Plan. Additionally, the recently implemented ERM program is effectively identifying the risks and the respective contingencies required to develop a realistic project budget.

### **2.5.2 Track and Systems Elements**

The identified budget for the TSC scope of work is \$2.326 billion, which includes project and construction management services and costs for testing the completed

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<sup>14</sup> Cost Table, January 2021.



system. For 119 miles of single-track, electrified rail, the average cost is about \$19.5 million per mile. Comparative analysis of cost per mile of construction on similar rail projects (under historic escalation conditions) indicates that this amount is adequate to cover the track and systems costs.

The budgeted value for the TSC is \$2.108 billion, or 90% of the total cost. The total budget includes cost contingency representing about 26% of the estimated cost. The cost estimate for the TSC included a range of expected contract award values, which effectively increases the available contingency by about 13%. The amount of contingency included in the budget is reasonable, given that risks for design, third party, utility and differing site conditions should be far lower for this contract than for CPs 1-4. However, it may not be sufficient to cover current materials and labor escalation impacts that are expected to significantly increase construction costs. The Authority is largely protected from cost increases on its existing fixed-price contracts and bid amounts and negotiated contract conditions could additionally reduce this risk moving forward.

The overall cost estimate also includes \$420 million in program-level unallocated contingency, \$208 million in interim use project reserve and \$687 million in program support costs. The total budget for the Central Valley Segment is \$13.855 billion. In PFAL’s opinion, the Authority can deliver the Segment scope of work for the 2023 Project Update Report amount, presuming that it implements enhanced project and program management processes through the ERM Program and secure any funding needing to cover any cost increases.

## 2.6 CENTRAL VALLEY SEGMENT FUNDING

The analysis of the Segment funding sources is important to demonstrate sufficient funding is available to meet the proposed construction schedule. The Funding Plan includes \$13.855 million for the Segment as seen in Table 810. The Segment will be funded through three sources: Prop 1A, Federal grants, and State Cap-and-Trade proceeds.

Table 8: Central Valley Segment Funding Sources

Sources	(YOE \$ million)
Prop 1A	\$6.809
Federal Grants	\$3.009
Cap-and-Trade	\$4.036
<b>Total</b>	<b>\$13.855</b>



### 2.6.1 Federal

Total Federal funding for the Segment is \$3.009 million. The total Federal funding is comprised of two separate sources as shown in Table 11: the American Recovery and Reinvestment Act Grant as amended in May 2016 (“ARRA”) between the FRA and Authority<sup>15</sup>; and the FY 2010 Cooperative Agreement between the FRA and Authority as amended in June 2021 (“FY 2010”)<sup>16</sup>. The Authority also was recently awarded a \$25 million grant from the federal government that is not included in the amounts described below.

*Table 9 - Federal Grants for Central Valley Segment*

<b>Federal Funding</b>	<b>(YOE \$ million)</b>
ARRA	2.080
FY 2010	929
<b>Total</b>	<b>3.009</b>

ARRA allocated \$2.5 billion in grant funding to the Authority, of which \$2.080 billion has been allocated towards Segment construction. All Segment-related ARRA funds were expended by the grant deadline of September 2017. These funds require a match from state funds. A tapered match has been approved by the FRA that allowed the expenditure of federal funds first, followed by the expenditure of state matching funds. The full \$2.5 billion in ARRA funds have been matched by state funds.

The ARRA Cooperative Agreement initially set a performance period end date of December 31, 2022. PFAL reviewed the Scope of Work in the ARRA Cooperative Agreement, as it pertains to the elements included in the Funding Plan, and found it is in compliance with the Funding Plan’s schedule.

In FY 2010, Congress appropriated a \$929 million federal grant from Transportation, Housing and Urban Development funds (“the FY10 funds”), and resolution was recently reached between the Authority and FRA on this funding. Per the terms of the federal grant agreement, the FY10 funds, along with \$360 million of state matching

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<sup>15</sup> California High-Speed Train Program ARRA Grant (FR-HSR-0009-10-01-06). FRA. 2016.

<sup>16</sup> Initial Central Valley Section: Madera County to Bakersfield (Kern County) of the California High-Speed Train Program (FR-HSR-0118-12-4). FRA. 2021.





funds, are scheduled to be the last contribution required to complete the federal grant scope of work.

The FY10 funds were the subject of a dispute between the FRA and the Authority. In June 2021, FRA and the Authority reached a settlement agreement that will result in the \$929 million in funding being made available to the Authority by FRA.

Amendment #4 of the relevant Cooperative Agreement (dated June 15, 2021) also extends the project performance period and federal funding period by four years, to December 31, 2026.

As required in the ARRA Cooperative Agreement and reflected in the Central Valley segment Sources & Uses table, all ARRA funds have been expended in advance of the \$928.6 million of FY10 funds.

### **2.6.2 Cap-and-Trade**

The Funding Plan includes \$4,036 million in Cap-and-Trade proceeds, roughly 30% of the total Central Valley segment funding through FY 28-29.

The California Air Resources Board implements the Cap-and-Trade program and oversees the quarterly auctions. In 2014, the Legislature continuously appropriated 25 percent of annual Cap-and-Trade funds for high-speed rail. In July 2017, the Legislature approved Assembly Bill (AB) 398, which was then signed into law by Governor Brown. This legislation implemented several measures to stabilize the Cap-and-Trade Program, including extending the sunset date through December 31, 2030; this was an important step by the Legislature toward securing a long-term, stable source of funding for High-Speed Rail and for regional transit and rail projects statewide. As of June 2022, the Authority has received approximately \$5.1 billion in Cap-and-Trade funds, which includes the initial \$650 million one-time appropriations and quarterly auction proceeds since August 2015.

Based on information provided by the Authority, we understand that its Cap-and-Trade proceeds are subject to market conditions, which cannot be predicted. We have observed that over the last five years, the Cap-and-Trade proceeds that have been provided to the Authority have ranged from \$98.4 million to \$319.9 million per quarter, although unusually low proceeds of \$10.6 million were made available in May 2020, which the Authority attributes to COVID-related impacts.

The quarterly Cap-and-Trade auction has insufficient historical information or comparable benchmarks that would allow us to independently verify the Authority's Cap-and-Trade planning assumptions. Despite this, PFAL made best efforts to analyze the reasonableness of the Funding Plan's use of Cap-and-Trade proceeds given the recent volatility in Cap-and-Trade auction results. We note that the



Authority has included conservative projections in the Funding Plan, at the low end of the revenue estimate range described in the 2022 Business Plan.

The high-level analysis of the Funding Plan's Cap-and-Trade use is based on the assumption that these funds will be used on a pay-go basis (as indicated in the Funding Plan), and that Cap-and-Trade funds will be spent according to the Central Valley segment Sources and Uses schedule dated May 2022 (though funding can be distributed on an as-needed basis per year).

In summary, we have not had access to the methodology behind the original state estimates for Cap-and-Trade proceeds, so we offer no opinion on the reasonableness of their forecasts. However, we do have confidence that Cap-and-Trade proceeds will be made available to the Authority to support this Funding Plan and that the Authority will use these funds to build their funding reserves as indicated in the Funding Plan.

## 2.7 DESIGN

### Track Alignment and Geometrics

A representative sample of CP 1-4 Release for Construction ("RFC") Guideway geometrics packages were reviewed. Of these segments and components reviewed, the vertical grades, curve radii, and spiral lengths meet the requirement for high-speed rail operability as dictated by the Business Plan. PFAL recommends that clearance envelopes between oncoming trains, platform edges, walls, signal and power pole foundations, vehicle mirrors and other potential conflict areas be verified as the systems design elements are developed. The technical requirements specified in the CP Contracts dictate the static, dynamic, and structural gauges used in developing the CP Contract Directive Drawings. These Directive Drawings were provided to the CP Contractors and are reflected in the RFC drawings.

It should be noted that spiral lengths, horizontal and vertical curve geometries, and super elevations for high-speed operations will differ from those required at the more immediate and slower train speeds. Higher superelevation values at lower operating speeds during the interim operating period can increase track wear at the interface of the vehicle wheels and the inside rail (low rail). Additional maintenance costs and safety inspections should be considered during the interim operating period. Additionally, curves with high superelevation at lower interim operating speeds could influence passenger comfort levels.

## Structures and Geotechnical

Structural reviews were based on the available information from the Release for Construction Bridge (RFC) Plans, Final Geotechnical Reports, 2021 Proposition 1A Funding Plan, and other design documents. Structural review of the CP 1-CP 4 Construction Packages shown in the 2.6.0 List of Drawings indicates that most of the bridge structures have been released for construction and it appears that design is substantially complete.

While a completed design may help mitigate risk, cost increase and delay, risks due to unforeseen conditions encountered during construction may still exist. The teams' funding mechanisms and risk management strategies to account for risk areas related to poor soils conditions, deep foundations near utilities, and environmental conditions as identified during the design phase, but not yet constructed, were clarified by The Authority as follows:

- The CP 1 Team does not anticipate having poor soil conditions for remaining work and is commencing with a subsidence analysis for Madera County to ascertain if there are subsidence issues on the Project. Additionally, CP 1 does not anticipate having issues with deep foundations close to utilities; with exception for the Intrusion Protection barrier where a design solution was reached to leave high risk utility gaps. Unforeseen Environmental issues are accounted for in the Project risk assessment. Environmental issues are covered in the Class 1- and 2-materials unit prices and hazardous materials abatement under the Provisional Sum.
- The CP 2-3 Team is accounting for risk areas related to poor soil conditions, utilities and environmental conditions in their risk registers and are constantly working on mitigation strategies with the DB contractor, Authority and Rail Delivery Partner.
- The CP 4 Team: is also accounting for the risks associated with the soil conditions in its registers to manage the risks and assessing the probabilistic estimate at completion (EAC). Since most of the structures are above ground in CP 4, they consider this risk as considered low. In addition, within the EAC, they have a residual risk related to unforeseen conditions encountered during construction (low probability/low impact).

In addition to bridges, significant retaining walls should also be considered. For example, cut walls (soil nail, soldier pile, secant pile, etc.) may require more extensive foundation systems and may encounter the higher risk parameters during construction. Additionally, any sites that identified the need for geotechnical ground improvements should be considered higher risk and should be accounted for in the risk register and RCMP.

- The Authority has indicated that retaining wall systems were used in CP 1, CP 2-3, and CP 4 final designs to shorten the length of aerial (i.e., viaduct)

structures. The secant pile cut walls (at deeper areas) and concrete U walls (at shallower areas) systems were used in CP 1 final design for the trenches to maintain the lower track profile and to fit the HSR Trackways within the area where the ROW is limited. The selection of the secant pile, soldier pile and soil nail walls application were determined based on the geotechnical data and engineering reports to minimize the risk parameters during construction.

- The CP 1 Team does not anticipate high risk parameters associated with the designed retaining wall foundations, and no ground improvements are anticipated outside of the potential subsidence. Significant cost impacts associated with the “sweeper packages” are not included in the EAC and pose high risk to the project budget. The CP 2-3 Team had previously accounted for risk areas related to retaining walls and ground improvements in their risk registers and are constantly working on mitigation strategies with the DB contractor, Authority and Rail Delivery Partner, as needed (e.g., including settlement periods in the schedule). Significant cost increases are being attributed to design and construction specification changes in CP 1.
- Based on the advancement of the construction of structures to date, the CP 4 Team has indicated they are familiar with the soil conditions within the project limits and expects that the retaining wall and ground improvement risk is very low on the IPB cast-in-place walls. This has been considered in their EAC assessment.

The CP 1 Team indicates that structure-related Change Orders make up a considerable portion of the total Change Orders by value, many of which have arisen due to changes to third party agreements such as Railroads, agreements with local municipalities or additive scope such as IPB, Sweeper packages, Caltrans Segment, and the North Extension. The CP 2-3 Team’s records show that more than 28% of the executed Change Order costs account for structures work (Design and Construction). The CP 4 Team did not identify how much Change Order work was from structures; however, they indicated they have maintained and updated risk registers since the inception of the project, and the EAC assessment and potential change orders assessment is based on current issues, trends, and risks.

Additionally, the Authority has been incorporating applicable lessons learned during the final design and construction phase of previous contracts into the specifications and design criteria of new contracts prior to each publication of the design criteria and prior to next procurement of construction. If effectively managed, it is possible that the CP 1-CP 4 Construction Packages can be delivered according to the information that will be provided in the 2023 Project Update Report (schedule and budget) that will be provided by the Authority and we consider the Authority’s current management structure and approach as appropriate for these contracts.



### 3. Suitable and Ready for High-Speed Rail

As described in the Funding Plan and the associated contract documents and Specifications, the Segment will be suitable and ready for HSR operations as stated in S&H Code Section 2704.08(d)(2)(B) and AB 1889 provisions in S&H Code Section 2704.78. As described in Section 2.2, the civil works elements of the Funding Plan are under construction and the remaining rail infrastructure elements for the Segment are planned and accounted for in the Funding Plan. On completion of the project, the usable segment will be suitable for testing high-speed trains. The implementation of the additional investments required by the Authority to begin its high-speed train operations, such as completion of the remaining portion of the San Francisco to Bakersfield line and the acquisition of high-speed trainsets, are described in the 2022 Business Plan but are not included in the Funding Plan that is the subject of this review.

## 4. Passenger Service Compatibility

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Based on the material PFAL has reviewed, there are no expected impediments to passenger train service in the Central Valley Segment once it is connected to other parts of the high-speed rail network or conventional rail trackage. Minimal investment will be needed to establish a physical track connection that facilitates interim passenger rail service that satisfies the Prop 1A statutory requirement.

### 4.1 SUITABILITY OF SIGNALING SYSTEM

The signaling system adopted by the Authority must be fit for the purpose of operating high-speed passenger trains. To understand the suitability of the train entitled control system specified for the HSR system, the review has examined the document Track and Systems Performance and Technical Requirements. Modern signaling projects take advantage of communications-based technology that avoid the use of track circuits because those technologies can reliably and safely determine train positions. While track circuits will not prevent HSR service, other approaches may be more efficient. It is presumed that Positive Train Control (“PTC”) will be implemented at the time of high-speed operations.

#### 4.1.1 Positive Train Control

The specifications for PTC must provide for continuous train detection, monitor and limit the movement of trains through interlockings of turnouts and junctions, and on-board monitoring of train speed and train responses to commands. These specifications will need to be consistent with the federal legislation requiring PTC for all rail systems.

### 4.2 SUITABILITY OF THE ELECTRIFICATION SYSTEM

The use of the Energy TSI (or equivalent) standard should ensure that a supplier will offer a proven product that will provide for interoperability and that is compatible with the proposed trains. Design documents related to electrification and power were not available for PFAL review. Interim and final operating plans were also unavailable. It is presumed that interim operations will be accommodated by the track and systems contractor without precluding full operations in the future. It is likely that additional investments will be required to transition between interim operations and the ultimate high-speed operating plan.



## 5. Operating Subsidy

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Section C of the Funding Plan indicates the Authority will not operate stand-alone high-speed train service in the Segment. Since no stand-alone high-speed train service will be operated by the Authority in the usable segment as defined in the Funding Plan, PFAL offers no opinion on the potential for an operating subsidy for the Segment.

## 6. Risks and Risk Mitigation Strategies

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Construction costs for CP 1-4 and the duration of construction have been severely impacted by the realization of risks. Delayed acquisition of right-of-way impacted the start of construction in many locations. Utility conflicts led to the need for design changes, additional delays and the need for additional right-of-way that is still impacting the construction schedule. Third-party requirements led to additional design changes and added costs. Differing site conditions impacted the progress of construction in some locations. PFAL notes the ongoing quantity of design changes and non-conformances continue to impact project cost and schedule.

The Authority is applying lessons learned from the design and construction experience on CP 1-4 to enhance its project delivery processes and risk management program. The FY 2020/2021 State Budget included the creation of a Risk Management Office, led by a Director of Risk Management and Project Controls. This independent office reports directly to the Board; in September 2020 a new director was appointed, and work began to enhance risk management oversight and develop the Authority's Enterprise Risk Management Program.

The Risk Management Office provides an independent risk analysis and data gathering function. An Enterprise Risk Committee (ERC), an oversight body including the Chief Executive Officer, the newly appointed Director of Risk Management and Project Controls, and other Authority executives, has been formed to evaluate and prioritize emerging risks, review management risk responses, and provide reports on the status of risks.

The Authority has a well-developed risk management process that includes industry standard risk identification, quantification and assessment procedures for the work elements that are in construction and ready for procurement. The risk analysis includes cost risks and schedule risks with their associated cost impacts. The risk assessment results are used to establish cost contingency amounts for each work package, based on the 70% confidence level. "Confidence Reports" are produced for each of the active construction contracts and these reports identify the top risks impacting each contract. Risk reporting includes the identification and impact assessment for identified risks, and charts projecting specific schedule impacts for the top identified risks. The Risk Chapter of the CVPFP and the ERM RCMP provide more refined and detailed identification and assessment of the risks for all contracts. DB contracts have been awarded and NTP has been issued on all civil works contracts for the Central Valley segment. Caltrans has completed the realignment of a portion of SR99 required to accommodate HSR. Construction is underway on CP 1-4, with approximately 53% of the forecast EAC completed. With the execution of the





DB contracts and completion of more than half of the contracted amount for construction, substantial amounts of design and construction risks have been transferred to the contractors completing CP 1-4. Changing design requirements after execution of the contracts causes the Authority to absorb substantial cost and schedule risk during through all stages of DB delivery.

Remaining risks for the civil works include continuing third-party coordination (primarily railroads and utility companies) and risks associated with Authority support of construction (primarily right-of-way delivery delays), and interface risks among the civil works contracts and between the civil works and follow-on work for the installation of rail infrastructure.

The Enterprise RCMP, risk registers, top risks for each of the CP1-4 contracts, and the Enterprise Risk Policy was provided for PFAL review. In addition, the Authority provided the Risk Chapter from its submittal to FRA of the CVPFP. These documents provide comprehensive descriptions of the Authority's risk management processes and identifies the top risks for CP1-4 and for the TSC. The top risks for TSC did not include market risks and focused on the interfaces between the TSC and CP1-4. Full risk registers, including detailed descriptions of specific risks, probabilities of occurrence, projected impacts and mitigation strategies are considered confidential information by the Authority and were not transmitted for review. The Authority provided PFAL the risk assessment information in aggregate form instead of by individual issue due to commercial negotiation concerns for existing contracts. PFAL was able to verify the comprehensive process in place to identify and quantify risk. We were not able to confirm whether the individual risk contingency amounts reconcile with the aggregate total contingency available. It is presumed that the Authority will confirm adequacy of project contingency with 2023 Project Update. Risk impact assessment and identification of mitigation measures for top risks is provided in the Confidence Reports for CP 1-4 and the current project budget identifies cost contingencies for some risks elements of the program scope of work.

PFAL's review finds that the budgeted costs for the active construction packages reflect industry standard risk assessment. The level of contingency may be adequate to address the cost impact of the identified construction risks, including impacts to construction management and other costs not included in the construction contracts. With respect to the project schedule, the review concludes that the forecast completion date for CP 1 reflects some identified risk impacts to the schedule. The available reporting data for CP 2-3 and CP 4 does not allow PFAL to fully to assess whether schedule risks are included in the projected completion dates for these packages. The schedule information provided for the planned Track and Systems package does not allow us to confirm whether risk-based schedule float is included in the projected completion date, although the overall duration of 6.8 years appears



adequate. It is unclear how the 1-year delay in issuing NTP for the TSC will impact overall completion of the Central Valley Project.

The budgeted cost for the Track and Systems work includes contingency reflecting the 70% confidence level based on identified risks. In addition, the estimated award cost for the Track and Systems Contract includes a range that reflects anticipated market risks under historical inflation measures. In PFAL's opinion the overall cost contingency included in the Track and Systems budget should be verified with the 2023 Project Update.

Risk-informed contingency assessment has been completed for non-construction components of the program budget, including as real estate, construction management services and program-level costs. The budgets for these items include identified contingencies to provide a 70% confidence level in the budgeted cost. PFAL was not provided any quantitative information resulting from the risk assessment process for these items, other than the contingency amount provided in the budget. Ongoing challenges related to non-construction items should also be reevaluated.

After our review of the Central Valley segment and its associated risk management approach, we believe that, while risks certainly exist, the Authority has developed an appropriate industry-standard risk management process to manage those risks. The overall cost, funding, and contingency appear adequate for the immediate term and our overall assessment is that some of the major risks, except for escalation have been recognized and measures are being taken to mitigate or account for those risks in the project budget. However, in this current environment, construction bids received for projects across the nation are exceeding engineers estimates by 20%-80%, and more in some instance. This metric also applies to change orders being negotiated for ongoing projects. Steel, copper, wood, cement, cabling and others specific to systems elements are among the highest cost elements.

## 6.1 INTERFACE RISKS

This complex program has numerous interfaces and therefore a wide range of risks. In this review, this is observed particularly in the TSC specification, where a number of technical disciplines are included and where it is specified that the contractor will be responsible for integration. The Authority will need to monitor this integration and assist in mitigation where necessary, particularly in respect of dealing with interfaces with utilities and other bodies external to the main contract. The current cost and schedule trends for the CP 1-4 contracts warrant rigorous attention and analysis by the Authority to validate project cost and schedule.



## 7. Conclusions

Having completed our analysis of the Funding Plan, PFAL’s conclusions are as follows:

SHC 2704.08(d)(2) requirements	PFAL Opinion
Construction of the corridor or usable segment thereof can be completed as proposed in the plan submitted pursuant to the Funding Plan	The Segment can be constructed as proposed in the Funding Plan subject to the Authority implementing its planned enterprise risk management program, effectively mitigating identified and future risks to ongoing and future construction, and successfully awarding the Track and Systems contract in late 2022; The Authority will need to re-evaluate the project budget and schedule with the 2023 project update report and implement actions as needed. See Section 2
If so completed, the corridor or usable segment thereof would be suitable and ready for high-speed train operation	The Authority does not contemplate high-speed passenger train service in this Funding Plan. Our assessment is that when completed as planned, the Segment will be suitable and ready for high-speed train operation as stated in AB 1889; See Section 3
Upon completion, one or more passenger service providers can begin using the tracks or stations for passenger train service	The Segment can facilitate passenger train service; See Section 4
The planned passenger train service to be provided by the Authority, or pursuant to its authority, will not require an operating subsidy	The Authority does not contemplate passenger train service to be provided by the Authority or pursuant to its authority in this Funding Plan, see Section 5
An assessment of risk and the risk mitigation strategies proposed to be employed	Risks are identified by the Authority, A comprehensive risk management program is in place and is being finalized. The ongoing trend of schedule slippages, cost increases and high escalation warrants the Authority to re-examine budget contingency; see Section 6 for a risk summary

## Appendix I – Bibliography

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2022 Business Plan and Technical Supporting Documents. California High Speed Rail Authority.

2022 Proposition 1A Funding Plan. California High Speed Rail Authority. Various drafts. Final draft September 2022.

2020 Business Plan. California High Speed Rail Authority. February 2021.

2020 Business Plan Technical Supporting Document: 50-Year Lifecycle Capital Cost Model Documentation. California High Speed Rail Authority. May 2020.

2020 Business Plan Technical Supporting Document: Capital Cost Basis of Estimate Report. California High Speed Rail Authority. February 2021.

2020 Business Plan Technical Supporting Document: High, Medium and Low Cash Flow Analysis. California High Speed Rail Authority. February 2020.

2020 Business Plan Technical Supporting Document: Ridership and Revenue Forecasting. Cambridge Systematics. January 2020.

2020 FRA Program Management Plan Annual Update. California High Speed Rail Authority. September 2020.

2019 Equivalent Capacity Analysis Report. California High Speed Rail Authority. December 2019.

AB 180. California State Assembly, June 2022.

AB 198. California State Assembly. June 2022.

Board Memo on Design Contract Award Recommendation. California High Speed Rail Authority. August 2022.

California High-Speed Rail Merced to Bakersfield Business Case Study. KPMG. February 2020.

California High-Speed Rail: Monitoring Report. FRA. December 2018.

Central Valley Prop 1A Funding Plan. California High Speed Rail Authority. February 2021.



Central Valley Project Financial Plan. California High Speed Rail Authority. September 2021.

Central Valley Project Financial Plan Risk Chapter Extract for Federal Fiscal Year Ending September 30, 2021. California High-Speed Rail Authority. August 2021.

Central Valley Segment Sources and Uses Analysis. California High Speed Rail Authority. August 2022.

Central Valley Segment Funding Plan Draft Sources & Uses. California High-Speed Rail Authority. May 2021.

Central Valley Segment System Management & Operations Interim Financial Plan. DB Engineering & Consulting. June 10, 2020.

Central Valley Status Report. California High Speed Rail Authority Finance and Audit Committee. March 2021 and July 2022.

CHSRA Program Risk Management Plan. California High-Speed Rail Authority. March 2017.

Cooperative Agreement. FRA and California High Speed Rail Authority. June 2021.

CP 1, 2-3, and 4 DVR Summary. California High-Speed Rail Authority. February 2021.

CP 1 Confidence Report. California High-Speed Rail Authority. February 2021.

CP 2-3 Confidence Report. California High-Speed Rail Authority. February 2021.

CP 4 Confidence Report. California High-Speed Rail Authority. February 2021.

CP 1-4 Non-Conformance Reort. California High-Speed Rail Authority, March 2021.

CY2016 CHSR Monitoring Report. FRA. February 2017.

Draft Program Delivery Status Report. California High-Speed Rail Authority. March 2021.

Draft Program Management Plan Rev 1.0. California High-Speed Rail Authority. December 2020.

Early Train Operator Side-by-Side Study Quantitative Report. DB Engineering & Consulting. February 8, 2020.



Early Train Operator Side-by-Side Study Quantitative Report. DB Engineering & Consulting. February 8, 2020

Enterprise Risk Management Policy. California High-Speed Rail. August 2022.

Finance & Audit Committee Central Valley Status Report. California High-Speed Rail Authority. March 2021.

FR-HSR-0188-12 Cooperative Agreement. FRA. June 2021.

Greenhouse Gas Reduction Fund Investment Plan and Communities Revitalization Act. California Senate. January 2014.

Land Use Master Plan Technical Memo. California High-Speed Rail Authority. June 2020.

Litigation Tracker. California High Speed Rail Authority. August 2021.

Integrated Organizational Chart. California High Speed Rail Authority. April 2021.

MANUAL-1000, Master Quality Plan Manual. California High-Speed Rail Authority. July 2020.

Monitoring Report. US Department of Transportation. December 2014. May 2016. February 2017. February 2018.

PFAL Recommendations on Structures and Geotechnical Work. PFAL. August 2021.

POLI-1006, Quality Management System Policy. California High-Speed Rail Authority. July 2020.

Program Delivery Status Report. California High Speed Rail Authority. March 2021.

Program Level Schedule. California High-Speed Rail Authority. March 22, 2021.

Program Configuration Management Plan. California High-Speed Rail Authority. December 2020.

Program Risk Management Plan. California High-Speed Rail Authority. March 2017.

Project Commitment Process Report. California High-Speed Rail Authority. August 2022.

Project Update Report to the California State Legislature. California High-Speed Rail Authority. May 2019.



Review of Program Management Plan. Federal Railroad Administration. February 2022.

Ridership and Revenue Model Documentation. Cambridge Systematics. February 17, 2016.

Risk Registers. California High-Speed Rail Authority. April 2022.

SB 198. California State Senate. June 2022.

SB 1029 Project Update Report. California High-Speed Rail Authority. 2019.

Side-by-Side Peer Review Report on Ridership, Revenue, and Operations. RSG. February 3, 2021.

Site Monitoring Report. FRA. October 22, 2013.

Summary of High-Speed Rail Budget Agreement for Proposition 1A. California High-Speed Rail Authority. August 2022.

Track and Systems RFP Addenda 1 – 10. High Speed Rail Authority. April 2022

## Appendix II – Document Request

Document Name / Description	Document Subject	Date of Document	Date of Request	Date Received
Project Management Plan	Project Management	October 2021 or later	7/25/2022	7/20/2022
Risk Management Plans	Risk Management	October 2021 or later	7/25/2022	7/29/2022
Construction Schedules	Construction Schedule	October 2021 or later	7/25/2022	8/1/2022
Cost Estimates	Capital Cost	October 2021 or later	7/25/2022	7/19/2022
Environmental Monitoring Reports	Environmental	October 2021 or later	7/25/2022	8/10/2022
Agreements Logs	Project Agreements	October 2021 or later	7/25/2022	8/4/2022
Project Status Reports	Project Management	October 2021 or later	7/25/2022	7/25/2022
MTAC monthly Monitoring Reports	Project Management	October 2021 or later	7/25/2022	N/A
CP 1 Confidence Report CP 2-3 Confidence Report CP 4 Confidence Report	Project Management	October 2021 or later	7/25/2022	8/1/2022
CP 1-4 Non Conformance Report	Civil	October 2021 or later	7/25/2022	7/29/2022
Design Variance Reports	Civil	October 2021 or later	7/25/2022	8/4/22 - 8/9/22
Risk Registers	Risk Management	October 2021 or later	7/25/2022	7/29/2022
Project Update Reports post 2019	Risk Management	2019 or later	7/25/2022	N/A
2020 Business Plan (any updated from previous draft)	Project Management	2020 or later	7/25/2022	7/25/2022
2022 Business Plan and basis of estimate report	Project Management	2022	7/25/2022	7/19/2022
SB 198	Funding		7/25/2022	7/19/2022
AB 180	Funding		7/25/2022	7/19/2022
Prop 1A Funding Plan (final version)	Funding	February 2021	7/25/2022	9/1/2022





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