

Top 5 Near-Term Risks	Severity*	Mitigation Actions
ROW acquisition delays or failure to acquire ROW impacts construction operations	P I	<ul style="list-style-type: none"> Partner with the contractor(s) to potentially re-sequence or accelerate work as necessary based on parcel availability (IP) Settlement team established to focus on high priority construction parcels, team reviews ongoing (C) Continuous monitoring to identify and resolve delivery bottlenecks (IP)
Additional costs associated with railroad intrusion protection	P I	<ul style="list-style-type: none"> Working cooperatively with railroads to identify engineering solutions for mitigating the adjacency issues within Construction Package 1 and Construction Package 2-3 (IP) Directives are being issued to all contracts for intrusion barrier design and pier protection required for Type I/II structures (IP) Intrusion Protection barrier - Transmitted draft Intrusion Barrier Assessment report recommending design forces to FRA, Volpe, UPRR and BNSF, received comments and issued final draft report (C)
Delays in obtaining environmental clearance for re-examinations performed as a result of design refinements or agency decision to refine supplemental EIRs/EISs	P I	<ul style="list-style-type: none"> Conducting workshops with the Federal Railroad Administration and the Design-Build team to review re-examinations and early decision on course of action (IP) Prioritizing re-examinations of simple design refinements to ease FRA review (IP) Mitigating impacts to natural resources using an in-lieu fee program to phase permit approvals (IP)
Additional costs of requirements needed for railroad operations and delays associated with agreements, design exceptions (clear-span of property), review and approval, or other issues during construction (lack of flaggers)	P I	<ul style="list-style-type: none"> Working with UPRR to identify necessity of the requested modifications and mitigate the impact of HSR construction on UPRR operations at the lowest possible costs (IP) Finalized templates for Relocation and Construction, Purchase and Sales and Grade Separation agreements with BNSF (C) Execute final agreements with railroads at 100% design of grade separations, rail realignment and intrusion protection structures (IP) Assessed risks related to the railroad scope of work and recommended risk overlays to Railroad budgets (C)
Additional costs of utility relocations attributable to late transfer of utility work to DB and potential for as-yet unidentified utilities	P I	<ul style="list-style-type: none"> Value Engineering to make utility relocation designs more cost-effective (IP) Thorough review of DB utility cost proposals and compare against competitive market estimates (IP) Revised construction estimates based on revised utility conflict matrix and performed a risk overlay to account for relocations of unidentified utilities on the CPI contract (C)

*Note: **P** – Probability of occurrence; **I** – Potential Impact of the risk

Very High **High** **Medium** **Low** **Very Low**

Mitigation Actions: **IP** – In Progress; **C** – Complete

Source: Adapted from Section 9 - Risk Management of the CHSRA 2016 Business Plan issued on May 1, 2016, F&A Committee March 2016 Operations Report and CHSR Program Risk Assessments

Top 5 Long-Term Risks	Current Mitigations
Environmental Approvals	<ul style="list-style-type: none"> Continue implementation of a number of identified federal and state environmental clearance strategies and process improvements to achieve Notices of Determination (NOD)/Records of Decision (ROD) timelines (IP) Increased the Authority's and contractors' environmental resources and worked with the FRA and resource agencies to assign sufficient resources for environmental review & approval processes; staffing agreements underway in various stages of execution (IP) Currently implementing project permitting strategies on parallel schedules with EIRs/EISs (IP)
Financing and Funding	<ul style="list-style-type: none"> Continue to identify all necessary sources for the \$6 billion cost of the first construction segment in the Central Valley (IP) Continue to review and adjust scope of work over multiple phases to fit within available funding (IP) Advancing work with lenders and investors to accelerate private sector participation and get to operations early (IP) Continue to actively manage construction projects and other expenditures to ensure that all federal funds are spent before their deadline (IP)
Third Party Agreements	<ul style="list-style-type: none"> Collaborating with utilities and the FRA for early identification of any potential Buy America issues, and negotiations are continuing on agreements to resolve remaining issues (IP) Managing utility design and construction requirements, and finalizing all cooperative utility agreements, in coordination with the affected utility companies (IP) Changing utility work to be under the control of the design-build contractor to allow for better scheduling and control by the contractor to prevent delays and utilizing value engineering to make utility relocation designs more cost-effective (IP) Thoroughly reviewing contractor utility cost proposals and comparing against competitive market estimates (IP)
Right-of-Way	<ul style="list-style-type: none"> Secure adequate funding and staffing with appropriate skills to process the volume of acquisition in a timely manner (IP) ROW Division working with teams developing new segment alignments to evaluate costs and minimize complex parcels that require longer acquisition schedule (IP) Clearing additional width along corridors to reduce secondary ROW acquisitions from same owners resulting from design changes / refinements (IP)
Engineering and Environmental challenges associated with tunnels in mountainous terrains - Design, constructability and commercial challenges; Groundwater resources; & Geotechnical investigation (GI)	<ul style="list-style-type: none"> Perform preliminary hazard analysis on tunneling, ventilation and geotechnical risks (IP) Continue to explore provisions to cross active faults on at-grade alignments where practical or crossing faults in underground structures with seismic fault chambers that accommodate shifts in track alignment (IP) Need to accelerate geotechnical work southern California section to complete the characterization of active faults Employ design solutions such as liners, gaskets or pre-excavation grouting to control of groundwater inflows & establish a groundwater resource monitoring program (IP) Develop a standard package to clear geotechnical investigation working using categorical exemptions under CEQA and categorical exclusions under NEPA. Having other approaches as backups, short of EIRs/EISs (IP)

Note: The probability and impact of these risks are dependent on decisions and policy that the Authority has not yet settled. Therefore, it is too early to include a severity column.

Source: Section 9 - Risk Management of the CHSRA 2016 Business Plan issued on May 1, 2016 Mitigation Actions: **IP** – In Progress; **C** – Complete

	Construction Package 1	Construction Package 2-3
Award Value (Original Contract)	\$1,022,988,000	\$1,394,567,890
Cost (Remaining Contingency / Remaining Contract Value)	<p>←</p> <p>July Report: 14.3% August Report¹: 8.3%</p>	<p>→</p> <p>July Report: 21.4% August Report¹: 22.1%</p>
Schedule Performance Index (Earned Value / Planned Value)	<p>→</p> <p>July Report: 0.34 August Report¹: 0.37</p>	<p>→</p> <p>July Report: 1.00 August Report¹: 1.01</p>
ROW Acquisition (Actual ROW Spend / ROW Budget)	<p>→</p> <p>July Report: 88% August Report¹: 93%</p>	<p>→</p> <p>July Report: 40% August Report¹: 46%</p>
ARRA Status		
	Performance to Forecast	Total Grant Performance
ARRA Burn Rate Indicator (ARRA Paid to Date + Pending FRA Approvals + Accruals / ARRA Grant Forecast)	<p>→</p> <p>August Report As of June 30, 2016 HSR has attained 95.4% of the ARRA forecast.</p>	<p>→</p> <p>August Report² Overall, 64.7% of the Total ARRA Grant has been spent as of June 30, 2016, with 82% of the grant term completed.</p>

1 Metrics are from the July-2016 and August-2016 CA High-Speed Rail Board Reports

2 The ARRA funds were awarded to first allow the program to proceed through environmental approvals, preliminary design and proceed to construction, which is what has happened. Those early stages have significantly lower expenditure rates than construction, so expenditures could never have proceeded on a straight line, but would accelerate in the later stages of the grant period. With the construction activities of CP1 currently expanding, CP2-3 design accelerating and the execution of CP4, as well as other grant eligible activities, the Authority has planned for the bulk of ARRA expenditures to be loaded toward the end of the grant term. The ARRA funds will be expended in line with the grant terms and the Authority is on track to fully expend the ARRA grant funds.

Cost (Remaining Contingency / Remaining Contract Value)

- The goal is to contain the contingency in the range of 10-20%. As per Federal Transit Administration guidelines, cost for contingency should be in the range of 10% to 20% of construction cost during the 15% - 30% Preliminary Design Phase.

- CP1: The Remaining Contingency = [Current Allocated Contingency Amount] – [Executed Change Orders Affecting Contingency] = \$80,657,585

The Remaining Contract Value = [Revised DB Contract Amount] – [Authority Approved Invoices to Date] = \$976,488,826

- CP2-3: The Remaining Contingency = [Current Allocated Contingency Amount] – [Executed Change Orders Affecting Contingency] = \$257,386,245

The Remaining Contract Value = [Revised DB Contract Amount] – [Authority Approved Invoices to Date] = \$1,152,880,561

- The updated Construction Package 1 (CP1) cost risk analyses performed by the Authority's Risk Management Program indicates a negative trend with respect to three particular cost risks.

These cost risks relate to intrusion protection and other requirements requested by the adjacent railroads and ROW acquisition. On February 16, 2016, the F&A Committee and Board of Directors was advised that the Authority is forecasting a need to increase contingencies on CP1 by approx. \$150 million. This forecast is incorporated in the 2016 Business Plan. The Authority's Risk Management Program is working in concert with Program Delivery to identify and implement risk mitigation strategies and potential savings. Mitigation involves strategies that consider alternative design and construction approaches not only on CP1 but program-wide as well.

Schedule Performance Index (SPI) (Earned Value / Planned Value)

- The goal is to achieve SPI ≥ 1, which is same as ≥ 100% when expressed in percent.

- Benchmark: As per guidelines by PMI (Project Management Institute, World Wide) the SPI should be ≥ 1 or 100%. At a value of 100% the Project is forecasted to complete on-time.

Earned Value (EV) = Percent Complete x Budget at Completion; PV= Planned Value; SPI measures how the contractors are tracking to the cost based schedule. For example, a project has been going for 3 months, and the budget is \$100/mo, or \$300 total. If, for the 3 months the contractor has done \$150 worth of work, then the Earned Value = \$150, the Planned Value = \$300, and the SPI = \$150/\$300 = 0.50.

- CP1: Due to the delay in starting substantial construction activities, the Contractor's earned value is lagging behind the planned value. This metric will improve as the Contractor continues to increase construction and the value of their monthly invoices increases. Continued advancement of the deliverables necessary to commence substantial construction will increase the value of the Contractor's work and subsequently this metric will improve.

- CP2-3: Currently on schedule.

ROW Acquisition (Actual ROW Spend / ROW Budget)

- ROW Acquisition is calculated as follows: (Actual ROW Acquired + Actual Preliminary ROW / Regular ROW Budget + Preliminary ROW Budget)

- CP1: The total number of CP1 parcels needed for delivery has changed (542 to 758) over time due to design-builder design refinements, estimates based on 15% designs, and public parcels transfer agreements. (Actual ROW Spend \$338M + Actual Preliminary ROW \$9M / ROW Acquisition \$365M + Merced-Fresno Preliminary ROW Budget \$9M) = \$347 / \$374M = 93%

- CP2-3: The total number of CP2-3 parcels needed for delivery has changed over time (543 in March-16 to 556 in August-16) due to estimates based on 15% designs, and public parcel transfer agreements. (Actual ROW Spend \$116M + Actual Preliminary ROW \$16M / ROW Acquisition \$268M + Fresno-Bakersfield Preliminary ROW Budget \$16M) = \$132M / \$284M = 46%

ARRA Burn Rate Indicator: Performance to Forecast and Total Grant Performance

- The ARRA Performance to Forecast as of June 30, 2016 is from the December-2012 FCP. The Total ARRA Grant Performance is from July-2010 to September-2017. The Authority is 82% through the grant period as of 6/30/2016.

- ARRA spending is increasing due to the ongoing acquisition of Right of Way and as construction continues to increase.

- The Performance to Forecast (2010- June 30, 2016) ARRA Burn Rate calculation is as follows: (ARRA FRA Paid Invoices to Date from 2010 thru 6/30/2016 \$1,337M + Drawdowns Pending FRA Approvals as of 6/30/2016 \$116M + Accruals as of 6/30/2016 \$198M / ARRA forecast \$1,730) = \$1,651M/\$1,730M = 95.4%

- The Total Grant Performance (2010-2017) ARRA Burn Rate calculation is as follows: (ARRA FRA Paid Invoices to Date from 2010 thru 6/30/2016 \$1,337M + Drawdowns Pending FRA Approvals as of 6/30/2016 \$116M + Accruals as of 6/30/2016 \$198M / ARRA Grant Total \$2,553M) = \$1,651M/\$2,553M = 64.7%