Modernization Program
Peninsula Corridor Electrification Project (PCEP)

November 2018
Monthly Progress Report

November 30, 2018

Funding Partners

Federal Transit Administration (FTA) Core Capacity

FTA Section 5307 (Environmental / Pre Development only)

FTA Section 5307 (Electric Multiple Unit (EMU) only)

Prop 1B (Public Transportation Modernization & Improvement Account)

Caltrain Low Carbon Transit Operations Cap and Trade

Proposition 1A

California High Speed Rail Authority (CHSRA) Cap and Trade

Carl Moyer Fund

Bridge Tolls (Funds Regional Measure (RM) 1/RM2)

San Francisco County Transportation Authority (SFCTA)/San Francisco Municipal Transportation Agency (SFMTA)

San Mateo County Transportation Authority (SMCTA) Contribution

SMCTA Measure A

Santa Clara Valley Transportation Authority (VTA) Measure A

VTA Contribution

City and County of San Francisco (CCSF) Contribution

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1.0 BACKGROUND

Over the last decade, Caltrain has experienced a substantial increase in ridership and anticipates further increases in ridership demand as the San Francisco Bay Area's population grows. The Caltrain Modernization (CalMod) Program, scheduled to be implemented by 2021, will electrify and upgrade the performance, operating efficiency, capacity, safety, and reliability of Caltrain's commuter rail service.

The PCEP is a key component of the CalMod Program and consists of converting Caltrain from diesel-hauled to Electric Multiple Unit (EMU) trains for service between the San Francisco Station (at the intersection of Fourth and King Streets in San Francisco) and the Tamien Station in San Jose. Caltrain will continue Gilroy service and support existing tenants.

An electrified Caltrain will better address Peninsula commuters' vision of environmentally friendly, fast and reliable service. Electrification will modernize Caltrain and make it possible to increase service while offering several advantages in comparison with existing diesel power use, including:

- **Improved Train Performance, Increased Ridership Capacity and Increased Service:** Electrified trains can accelerate and decelerate more quickly than diesel-powered trains, allowing Caltrain to run more efficiently. In addition, because of their performance advantages, electrified trains will enable more frequent and/or faster train service to more riders.
- **Increased Revenue and Reduced Fuel Cost:** An electrified Caltrain will increase ridership and fare revenues while decreasing fuel costs.
- **Reduced Engine Noise Emanating from Trains:** Noise from electrified train engines is measurably less than noise from diesel train engines. Train horns will continue to be required at grade crossings, adhering to current safety regulations.
- **Improved Regional Air Quality and Reduced Greenhouse Gas Emissions:** Electrified trains will produce substantially less corridor air pollution compared with diesel trains even when the indirect emissions from electrical power generation are included. Increased ridership will reduce automobile usage, resulting in additional air quality benefits. In addition, the reduction of greenhouse gas emissions will improve our regional air quality, and will also help meet the state's emission reduction goals.

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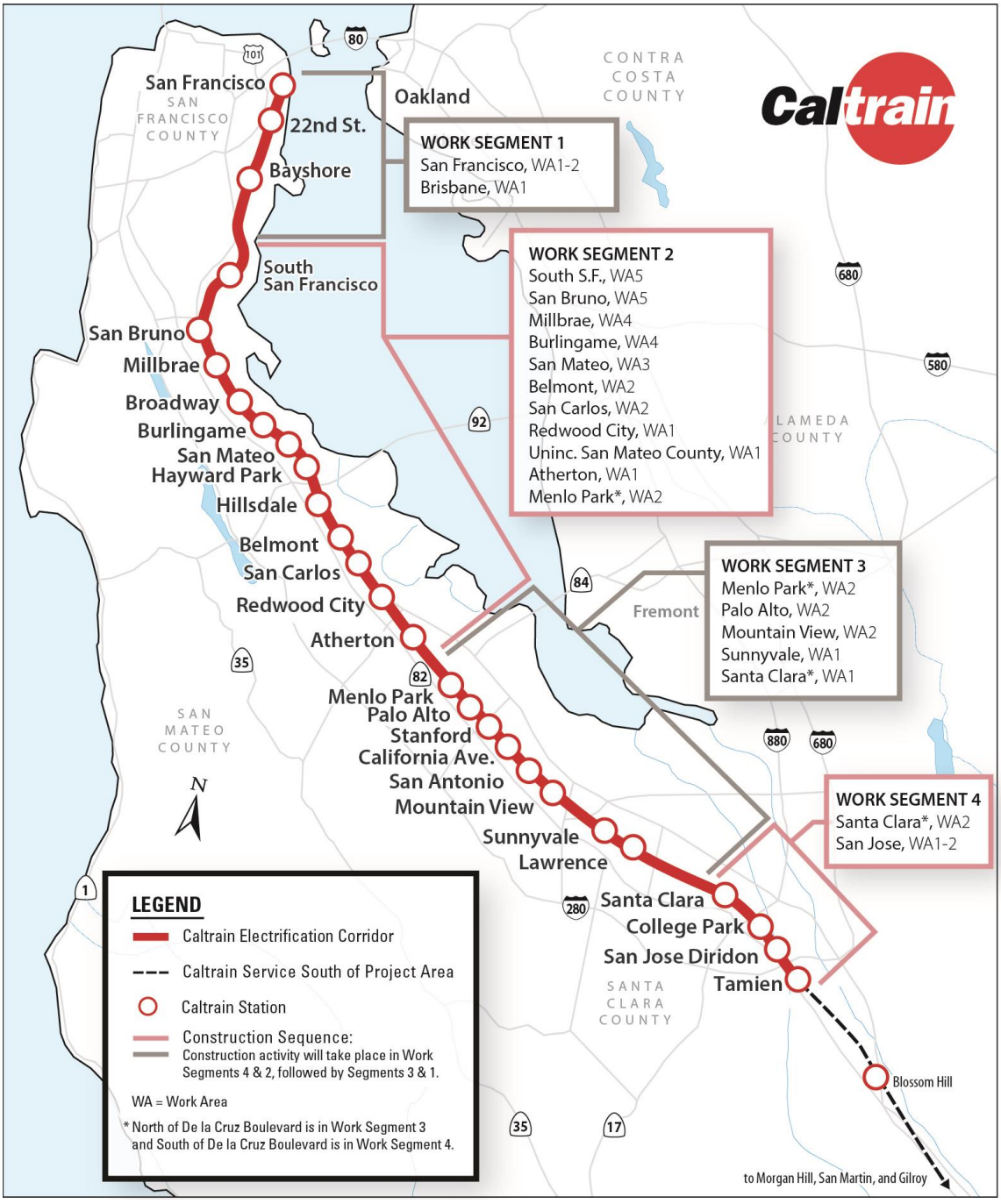
2.0 EXECUTIVE SUMMARY

The Monthly Progress Report is intended to provide an overview of the PCEP and provide funding partners, stakeholders, and the public an overall update on the progress of the project. This document provides information on the scope, cost, funding, schedule, and project implementation. Work along the Caltrain Electrification Corridor has been divided into four work segments and respective work areas (WA) as shown in Figure 2-1. PCEP activities are described and summarized by segments and work areas.

Figure 2-1 PCEP Work Segments



In November, 51 Overhead Contact System (OCS) foundations were completed and 88 poles were installed. Various construction activities progressed, including installation of cantilever arms and insulators and construction of ductbanks in preparation for installation of the signal house at Auzerais Avenue next month. Two wayside power cubicles, which are part of the traction power system, were installed at Control Point (CP) Center in Millbrae and CP Scott in San Bruno.

An important milestone was achieved this month: PG&E completed construction work required for the supply of temporary power. Construction of the interconnections between the PG&E substations and the Traction Power Substations and completion of the Traction Power Substations are required before temporary power is available.

Progress is being made towards the milestone completion of the first EMU trainset.

This month the Board authorized an amendment to ProVen's tunnel modification contract to include installation of the OCS (drop tubes, conductor rail, and testing) in the tunnel. Tunnel work this month included the completion of grouting and notching in Tunnel 1, completion of grouting in Tunnels 3 and 4, and continued notching work in Tunnel 2. Masonry work began on the historic Tunnel 4 South Portal.

2.1. Funding Partners Participation in PCEP

The PCEP has a series of weekly, biweekly, monthly and quarterly meetings to coordinate all aspects of the program. The meetings are attended by project staff with participation by our funding partners in accordance with the Funding Partners Oversight Protocol. A summary of funding partner meetings and invitees can be found in Appendix B.

This section of the report provides a summary of the discussions and decisions made at the meetings and a list of funding partners who attended the meetings.

Electrification – Engineering Meeting – Weekly

Purpose: To discuss status, resolution and tracking of Balfour Beatty Infrastructure, Inc. (BBII) and electrification design-related issues, to discuss Supervisory Control and Data Acquisition (SCADA), the Tunnel Modification Project, and monitor the progress of utility relocation compared to schedule, and to discuss third-party coordination activities with Pacific Gas and Electric (PG&E), CHSRA, Union Pacific Rail Road (UPRR), Bay Area Rapid Transit, California State Department of Transportation (Caltrans), Positive Train Control (PTC) and others.

Activity this Month

Funding Partners: CHSRA: Ian Ferrier

Continued discussions on resolution of outstanding issues for the Design-Build (DB) contract, review of key actions from weekly schedule review meetings, the progression of the PG&E interconnections design and substations improvement status, including interface with VTA on the design of TPS-2 interconnection into PG&E's FMC Substation, key interface points (foundation installation, signal design, etc.) between the PCEP and other major Peninsula Corridor Joint Powers Board (JPB) projects such as South San Francisco Station Project and 25th Avenue Grade Separation, the utility relocation

status, status of the Tunnel Modification construction and key project issues, updates of the SCADA project, updates on DB and program schedule, including key foundation and traction power facility milestones, upcoming changes to the contract in preparation for the Change Management Board (CMB), specific contract change orders that require technical review and input, and coordination with key third parties on design review and permitting for the project.

PCEP Delivery Coordination Meeting – Bi-Weekly

Purpose: To facilitate high-level coordination and information sharing between cross-functional groups regarding the status of the work for which they are responsible.

Activity this Month

Funding Partners: CHSRA: Ian Ferrier and Wai-on Siu; SFCTA: Luis Zurinaga

The Project Management Oversight Contractor (PMOC) was onsite to observe the Quality Assurance (QA) program. Alice Cho, a Senior Contract Officer with JPB, joined the PCEP team on November 12. Refresh of the electric locomotive is underway, but will be delivered about two months behind schedule due to nonworking components and the need to order new parts. The new arrival date is February 11. In Salt Lake City the first four carshells are undergoing installation of mounting brackets, conduits, and thermal insulation. Construction for temporary power is in progress. PG&E's cutover for temporary power was scheduled at the start of November, but has been pushed out due to the wildfires. Seven weekend shutdowns have occurred through November 20, and have successfully brought trains back into revenue service each Monday following the shutdowns. South Portal Masonry work began last Weekend and will continue over the next several weekends. Additional OCS scope (i.e., drop tubes and conductor rails) was approved by the Board on November 1, which adds four additional weekend shutdowns to the 24 current shutdowns for a total of 28.

Systems Integration Meeting – Bi-Weekly

Purpose: To discuss and resolve issues with inter-system interfaces and to identify and assign Action Item Owners for interface points that have yet to be addressed.

Activity this Month

Funding Partners: CHSRA: Ian Ferrier

Bi-weekly PCEP interface meetings are held to monitor and determine appropriate resolution for systems integration issues. The systems integration database is updated as issues are resolved or new items arise. Meetings are also held bi-weekly with the electrification contractor to discuss design and construction integration issues. The Systems Integration Lead is also setting up bi-weekly meetings with the EMU procurement team. The Traction Power SCADA team also holds bi-weekly status meetings. Coordination with the EMU procurement, PTC and Caltrain Capital Project managers responsible for delivery of the 25th Avenue Grade Separation Project, Marin Napoleon Bridge Rehabilitation Project, and the South San Francisco Station Project is ongoing. Caltrain's CEMOF modification project design bid package has been issued. Progress on activities including systems integration testing activities, Federal Railroad

Administration (FRA), FTA and safety certification are being tracked. The Systems Integration test plan has been resubmitted as Revision 1 and is under review.

Master Program Schedule (MPS) Meeting – Monthly

Purpose: To review the status of the MPS and discuss the status of major milestones, critical and near critical paths, upcoming Board review items, and progress with the contracts, among others.

Activity this Month

Funding Partners: CHSRA: Ian Ferrier; SFCTA: Luis Zurinaga; VTA: Manolo Gonzalez-Estay

The overall schedule remains unchanged. The forecasted Revenue Service Date (RSD) remains December 2021. The addition of approximately five months of contingency to account for potential risk to the project yields an RSD of April 2022. The program critical path runs through PG&E design and construction to provide permanent power, and concludes with pre-revenue testing. The near-critical path runs through manufacturing and testing of EMU trainsets, as well as energized testing of Traction Power Substation (TPS) 1 and final integrated testing.

Risk Assessment Meeting – Monthly

Purpose: To identify risks and corresponding mitigation measures. For each risk on the risk register, mitigation measures have been identified and are being implemented. Progress in mitigating these risks is confirmed at the ongoing risk monitoring and monthly risk assessment meetings.

Activity this Month

Funding Partners: CHSRA: Ian Ferrier; Metropolitan Transportation Commission (MTC): Trish Stoops

No risks were added or retired. Three risks were regraded.

See the Risk Management section (Section 11).

Change Management Board (CMB) – Monthly

Purpose: To review, evaluate and authorize proposed changes to PCEP over $200,000.

Activity this Month

Funding Partners: CHSRA: Bruce Armistead; MTC: Trish Stoops and Kenneth Folan; SFCTA: Luis Zurinaga; VTA: Krishna Davey; SMCTA: Joe Hurley

Major topics included potential changes to PCEP contracts, contingency usage, track access delays and Differing Site Conditions (DSC) field order updates.

Potential contract changes will follow the PCEP Change Order Procedure. Once approved changes are executed, they will be reported in the Change Management section (Section 9) of this report.

BBII Contract

One change was approved.

Stadler Contract

One change was approved.

SCADA Contract

No changes were identified for consideration.

Tunnel Modification Contract

No changes were identified for consideration.

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2.2. Schedule

The current Master Program Schedule (MPS) reflects a Revenue Service Date (RSD) of December 2021, without adjustment for contingency. This is consistent with the revised baseline established in November 2017. With the addition of approximately five months of contingency to account for potential risk to the project, the RSD is anticipated as April 2022. Due to FTA contingency requirements, a Full Funding Grant Agreement (FFGA) RSD will also be tracked. This date is forecast as August 22, 2022 and represents the final milestone in the Program Plan.

The program critical path runs through PG&E design and construction to provide permanent power and concludes with pre-revenue testing. The near-critical path runs through design and manufacturing of EMU trainsets. There is no change to the critical and near-critical paths from the prior reporting month.

Table 2-1 indicates major milestone dates for the MPS.

Table 2-1 Schedule Status

Milestones	Program Plan	Progress Schedule (November 2018)[1]
Segment 4 Completion to Begin Vehicle Testing	11/21/2019	02/06/2020[2]
Arrival of First Vehicle at JPB	07/29/2019	07/15/2019
Electrification Substantial Completion	08/10/2020	06/23/2021[2]
PG&E Provides Permanent Power	09/09/2021	09/09/2021
Start Pre-Revenue Testing	09/10/2021	09/10/2021
RSD (w/o Risk Contingency)	12/09/2021	12/09/2021
RSD (w/ Risk Contingency)	04/22/2022	04/22/2022
FFGA RSD	08/22/2022	08/22/2022

Note:
1. Dates may shift slightly as the update of this month's Progress Schedule is still in progress.
2. See "Notable Variances" in Section 7 for explanation on date shift.

2.3. Budget

A summary of the overall budget and expenditure status for the PCEP is provided in Table 2-2 below.

Table 2-2 Budget and Expenditure Status

Description of Work	Budget (A)	Current Budget (B)[1]	Cost This Month (C)[2]	Cost To Date (D)[3]	Estimate To Complete (E)	Estimate At Completion (F) = (D) + (E)
Electrification Subtotal	**$1,316,125,208**	**$1,316,125,208**	**$15,006,821**	**$449,490,766**	**$866,634,442**	**$1,316,125,208**
EMU Subtotal	**$664,127,325**	**$664,127,325**	**$720,990**	**$131,102,568**	**$533,024,757**	**$664,127,325**
PCEP TOTAL	**$1,980,252,533**	**$1,980,252,533**	**$15,727,811**	**$580,593,334**	**$1,399,659,199**	**$1,980,252,533**

Notes regarding tables above:
1. Column B "Current Budget" includes executed change orders and awarded contracts.
2. Column C "Cost This Month" represents the cost of work performed this month.
3. Column D "Cost To Date" includes actuals (amount paid) and accruals (amount of work performed) to date.

2.4. Board Actions

- November
  - Award Special Testing and Inspection Services contract
  - Contract Change Order for CHSRA-requested pole modifications
  - Amend contract with ProVen Management, Inc. to include the OCS option in the Tunnel Modification contract

Future anticipated board actions include:

- December
  - Award of Safety and Security Support Services
  - Exercise Contract Option with Stadler for Procurement of Additional EMUs
- January
  - Award of Construction Management Support Services contract
- February
  - Award of CEMOF Facility Modifications
  - PG&E interconnect construction

2.5. Government and Community Affairs

There were six outreach events this month.

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3.0 ELECTRIFICATION – INFRASTRUCTURE

This section reports on the progress of the Electrification, SCADA, and Tunnel Modification components. A brief description on each of the components is provided below.

3.1. Electrification

The Electrification component of the PCEP includes installation of 138 miles of single track and OCS for the distribution of electrical power to the EMUs. The OCS will be powered from a 25 kilovolt (kV), 60-Hertz, single phase, alternating current supply system consisting of two traction power substations (TPS), one switching station (SS), and seven paralleling stations (PS). Electrification infrastructure will be constructed using a DB delivery method.

Activity This Month

- OCS foundation installation continued in Segment 2.
- Fabrication of cantilevers and brackets continued at the Contractor's South San Francisco warehouse.
- OCS pole installation, cantilever arm installation, insulator installation and bracket setting continued in Segment (S) 2 Work Area (WA) 5 and S2WA4.
- Potholing at proposed OCS locations and utility locations continued in Segments 1, 2, 3, and 4 in advance of foundation installation. BBII and PCEP also continued to resolve conflicts found during the potholing process, such as loose concrete, asphalt, and other debris, and began designing solutions for those conflicts that cannot be avoided. The conflicts must be resolved before the installation of foundations at those locations.
- Relocation of signal cables found in conflict with planned OCS foundations continued as conflicts are identified.
- Continued ductbank, manhole, and pull box installation at TPS-2.
- Continued site work, ductbank installation, and transformer foundation work at TPS-1. Main transformer for TPS-1 is expected to arrive by the end of December.
- Continued ductbank and foundation installation in Segment 2 for signal and wayside power cube units at Control point (CP) Scott, CP Trousdale, CP Center and CP Sierra.
- Installed wayside power cubicles at CP Scott in San Bruno and CP Center in Millbrae.
- Continued conduit installation in Segment 4 at Auzerais Avenue in preparation for signal house installation.
- Continued progression of the OCS design with BBII in all segments, which included submittal and review of Design Change Notices for revised foundation locations.
- Continued design review coordination with local jurisdictions for the OCS, Traction Power Facilities, and Bridge Attachments design, including responses to comments from jurisdictions.

- Continued to review and coordinate signal and communication design submittals with BBII.
- Submitted follow-up information to UPRR regarding grade crossing designs. UPRR is currently reviewing information provided.
- Reviewed and approved 95% Traction Power Facilities Plans Segments 1.
- Reviewed and provided comments for 95% Bridge Screening and OCS Attachments Segments 1 and 3 for review.
- Received and reviewed Station and Structure Bonding for Segments 2 and 4.
- Received Station and Structure Bonding for Segments 1 and 3.
- The PCEP team and BBII continued to work through Site Specific Work Plans (SSWP) for upcoming field work.
- Continued tree pruning and removals in Segment 3.
- The PCEP team continues to work with PG&E for the finalization of protection scheme studies.
- PG&E cutover for interim power is complete.

A summary of the work progress by segment is provided in Table 3-1 below.

Table 3-1 Work Progress by Segment

Segment	Work Area	Foundations			Poles		
		Required[a]	Completed this Month	Completed to Date	Required	Completed this Month	Completed to Date
2	5	256	3	176	162	0	150
	4	316	5	217	259	88	111
	3	190	0	53	147	0	0
	2	260	29	45[b]	218	0	0
	1	206	14	51[c]	155	0	0
Total		**1,232**	**51**	**542**	**941**	**88**	**261**

Note:

a. Foundations required do not match poles required as guy foundations are needed in some locations for extra support.
b. In October's report, 12 foundations were reported completed in Segment 2 Work Area 2. The correct number is 16.
c. In October's report, 41 foundations were reported completed in Segment 2 Work Area 1. The correct number is 37.

Activity Next Month

- Continue resolution of DSCs.
- Continue foundation installation in Segment 2.
- Continue pole, cantilever, insulator and bracket installation in S2WA5 and S2WA4.
- Continue work with BBII on field investigation activities and designs, which will include the progression of the OCS, traction power, bonding and grounding, signal systems, and other civil infrastructure such as overhead bridge protections.
- Continue potholing and clearing of obstructions at proposed OCS locations. Potholing will continue in Segments 1, 2, 3 and 4.
- Continue construction at TPS-1 and TPS-2. Install main transformers at TPS-1.

- Continue conduit and foundation installations for signal and Wayside Power Cabinet units in Segment 2.
- Continue conduit and foundation installation for grade crossings houses in Segment 4.
- Begin installation of impedance bonds.
- Continue coordination with UPRR on grade crossing design. Follow up on information provided to UPRR for review.
- Continue coordination with stakeholders on the Consistent Warning Time solution and advance location specific design.
- Continue review of BBII work plans for upcoming construction activities.
- Continue to progress design for PG&E interconnection towards 65%.
- Continue coordination with PG&E on final design for PG&E infrastructure.
- Continue design reviews and coordination with local jurisdictions.
- Continue tree pruning and removals.

3.2. Supervisory Control and Data Acquisition

SCADA is a system that monitors and controls field devices for electrification, including substations, TPSs and the OCS. SCADA will be integrated with the base operating system for Caltrain Operations and Control, which is the Rail Operations Center System.

Activity This Month

- Submitted formal schedule for review and Monthly Progress Report.
- Modified and submitted Power and Heating, Ventilation and Air Conditioning (HVAC) Sufficiency Study for final acceptance.
- Performed laboratory setup for equipment testing.
- Continued the implementation of clearance, remote power terminal, and other feature development.
- Reviewed Points List and submitted updates.

Activity Next Month

- Prepare and deliver the Monthly Report and the Monthly Schedule.
- Attend project status meetings (on the phone of via web conference).
- Support on-going discussions concerning Requests for Information.
- Modify the display drawing.
- Modify the database reflecting design drawings from the Points List.
- Continue the implementation of clearance, remote power terminal, and other feature development.

3.3. Tunnel Modification

Tunnel modifications will be required on the four tunnels located in San Francisco. This effort is needed to accommodate the required clearance for the OCS to support electrification of the corridor. Outside of the PCEP scope, Caltrain Engineering has requested the PCEP team to manage completion of design and construction for the Tunnel 1 and Tunnel 4 Drainage and Track Rehabilitation Project. The Tunnel Drainage and Track Rehabilitation Project is funded separately from PCEP.

Activity This Month

- JPB Board authorized contract option to the ProVen Tunnel Modifications contract for additional scope to include OCS work.
- Successfully returned Caltrain to Revenue Service after eight total weekend shutdowns through November.
- Tunnel 1: Completed grouting and tunnel notching; installed all dry fix pins.
- Tunnel 2: Continued hand-notching (saw-cutting/chipping) and installed rebar.
- Tunnel 3: Completed grouting and ~85% of tunnel notching.
- Tunnel 4: Completed grouting; installed rock bolts; performed ~10% of Tunnel Notching.
- Began masonry work on the historic Tunnel 4 South Portal (removal of brick and archstones prior to reinstallation with increased tunnel notching).
- Continued OCS Termination Structure Foundation potholing and investigations outside all tunnel portals.
- Reviewed construction and contingency plans for track and drainage work activities. ProVen is resubmitting plans based on the review.

Activity Next Month

- Begin drainage activities starting north of Tunnel 1, moving south.
- Layout and install OCS anchor bolts in Tunnels 1 through 4.
- Start shotcrete activities in Tunnels 1 through 4.
- Commence track demolition and construction work in Tunnel 1.
- Complete investigations and begin installation of OCS termination structure foundations outside each tunnel portal.
- Continue reviewing submittals and SSWPs.
- Confirm construction and contingency plans for track and drainage work activities once plans are finalized.

4.0 ELECTRIC MULTIPLE UNITS

This section reports on the progress of the Electric Multiple Units procurement and the Centralized Equipment Maintenance and Operations Facility (CEMOF) modifications.

4.1. Electric Multiple Units

The EMU procurement component of the PCEP consists of the purchase of 96 Stadler EMUs. The EMUs will consist of both cab and non-cab units configured as 16 six-car fixed trainsets. Power will be obtained from the OCS via roof-mounted pantographs, which will power the electric traction motors. The EMUs will replace a portion of the existing diesel locomotives and passenger cars currently in use by Caltrain.

Activity This Month

- The Final Design Phase of EMU systems continues. Major systems have frozen their designs to commence prototype testing and series production. Car Interior designs are finalized. Software intensive systems (e.g., Monitoring and Diagnostic, Train Control and Passenger Information Systems) scheduled to be complete in late 2019.
- First three carshells (Cab Cars and Toilet Car) are in Stadler's Salt Lake City facility undergoing painting repairs from shipment damage, fitting of interior and underfloor and interior bracketry, thermal insulation installation, and cable duct installation.
- The three remaining carshells for Trainset 1 are in transit to Salt Lake City.
- Other Salt Lake City facility activities include manufacturing of electric cable harnesses and electric panel subassemblies.
- Stadler's new railcar manufacturing facility construction is on schedule and consistent to support EMU manufacturing activities.
- PTC technical and commercial discussions are progressing and the no-cost change order to implement Interoperable Electronic Train Management System (I-ETMS) is in development.
- EMU design coordination discussions continue with representatives from Caltrain Operations and Maintenance, Caltrain Public Outreach, the FRA, the FTA PMOC, Safety, QA, and PCEP Program Scheduling.
- The PCEP team continues to address systemwide interface issues involving the emerging EMU design, existing Caltrain wayside infrastructure, Electrification Project designs and the Caltrain PTC Program.
- Caltrain and FRA representatives discussed several aspects of the EMUs and FRA compliance. Caltrain is currently evaluating options and possible impacts.

Activity Next Month

- Continue truck manufacturing. Structural design tests scheduled for first quarter 2019.
- Continued with proof of design testing of key systems (propulsion, brakes, couplers, gearboxes).

- Continue system level first article inspections.
- Continue work with FRA on EMU compliance issues.

4.2. Centralized Equipment Maintenance and Operations Facility Modifications

The CEMOF Upgrade project will provide work areas for performing maintenance on the new EMUs.

Activity This Month

- Evaluate sole bid.

Activity Next Month

- Negotiate with sole bidder.

5.0 SAFETY

Safety and Security requirements and plans are necessary to comply with applicable laws and regulations related to safety, security, and emergency response activities. Safety staff coordinates with contractors to review and plan the implementation of contract program safety requirements. Safety project coordination meetings continue to be conducted on a monthly basis to promote a clear understanding of project safety requirements as defined in contract provisions and program safety documents.

Activity This Month

- Finalized the electrification OCS Safety Awareness presentation designed to support contractor staff and emergency responders' awareness of the OCS potential hazards and safety procedures.
- Co-chaired the monthly PCEP Safety and Security Certification and Fire/Life Safety Committee meetings.
- Developed a PCEP Construction and OCS safety awareness presentation for delivery to San Jose Fire Department senior staff.
- Project staff provided input and continued its participation in the BBII monthly "All Hands" contractor workforce safety meetings. Project incidents continue to be reviewed with project staff to reinforce the application of recommended safety mitigation measures.
- Continued to provide input and oversight of the contractor SSWP safety provisions and ongoing safety construction oversight and inspections.
- Provided inspection of ongoing contractor field activities and conducted site visits in preparation of new construction activities.
- Participated in weekly project coordination meetings with the contractor to review open issues and recommended action items.
- Reinforced the contractor equipment inspection program including the application of work equipment inspection stickers as a result of the increase of new contractor equipment being deployed for the project.
- Provided safety oversight with the initiation of the tunnel project contract work. Attended weekly project coordination meetings and reviewed and commented on contractor submittals.

Activity Next Month

- Monthly safety communication meetings continue to be scheduled for the Project Safety and Security Certification Committee, Fire/Life Safety Committee, and other project-related contractor and JPB safety meetings to discuss safety priorities.
- Provide Fire / Life Safety project overview and OCS safety awareness presentation to San Jose Fire Department Chiefs and trainers.
- Continue focus on performing site safety inspections on the OCS foundation, pole installations, potholing, and tree trimming field work to assess safety work practices and identify additional opportunities for improvement. Conduct contractor equipment inspections.

- Meet with the PCEP contractors, JPB safety, and Transit America Services, Inc. (TASI) to identify opportunities to further improve project safety performance and continue to reinforce lessons learned safety mitigation recommendations resulting from prior project incidents.
- Continue to provide safety and security oversight of the weekend shutdowns for Tunnel Project contract activities.
- Participate in the System Integration Committee and Rail Activation Committee meetings.

6.0 QUALITY ASSURANCE

The Quality Assurance (QA) staff performs technical reviews for planning, implementing, evaluating, and maintaining an effective program to verify that all equipment, structures, components, systems, and facilities are designed, procured, constructed, installed, and maintained in accordance with established criteria and applicable codes and standards throughout the design, construction, startup and commissioning of the PCEP.

Activity This Month

- Staff meetings with BBII QA/Quality Control (QC) management representatives continue weekly.
- Continued review of BBII-generated Nonconformance Reports (NCR) and Construction Discrepancy Reports for proper discrepancy condition, cause, disposition, corrective and preventive action and verification of closure.
- Continued review and approval of Design Variance Requests for BBII and PGH Wong for QA/QC and inspection issues/concerns.
- Continued review of BBII QC Inspectors Daily Reports, Construction QC Reports and Surveillance Reports for work scope, performance of required duties, adequacy, non-conformances, test/inspection results, follow-up on unresolved issues, and preciseness.
- Continued review of BBII Material Receipt Reports, Certificates of Conformance, Certified Tests Reports, and Certificates of Analysis to ensure delivered project materials conform to specifications, and that contractually required quality and test support documents are adequate and reflect concise conditions per the purchase order requirements.
- Continued regularly scheduled design reviews and surveillances on project design packages.
- Continued review of Stadler QA activities including: NCR review, Inspection Exception Reports, Car History Reports, and Weekly Status Reports.
- Conducted audit of BBII quality auditing, quality records and training.
- Conducted PGH Wong audits of two design packages; OCS Foundation and Pole Layouts at 95% and Traction Power Systems and Facility Plans at 95%.
- FTA/PMOC audited JPB Quality Assurance implementation of the Quality Management Plan and did not issue any findings.

Table 6-1 below provides details on the status of audits performed through the reporting period.

Table 6-1 Quality Assurance Audit Summary

Quality Assurance Activity	This Reporting Period	Total to Date
Audits Conducted	3	79
Audit Findings		
Audit Findings Issued	1	54
Audit Findings Open	0	0
Audit Findings Closed	1	54
Non-Conformances		
Non-Conformances Issued	0	8
Non-Conformances Open	0	0
Non-Conformances Closed	0	8

Activity Next Month

- Quality Systems audit of ASCO in North Carolina, manufacturer of automatic and manual transfer switches.

7.0 SCHEDULE

The current Master Program Schedule (MPS) reflects a Revenue Service Date (RSD) of December 2021, without adjustment for contingency. This is consistent with the revised baseline established in November 2017. With the addition of approximately five months of contingency to account for potential risk to the project, the RSD is anticipated as April 2022. Due to FTA contingency requirements, an FFGA RSD will also be tracked. This date is forecast as August 22, 2022 and represents the final milestone in the Program Plan.

The program critical path runs through PG&E design and construction to provide permanent power, and concludes with pre-revenue testing. The near-critical path runs through manufacturing and testing of EMU trainsets. Additionally, energized testing of Traction Power Substation #1 and final integrated testing have been added to the near-critical path.

Shown below, Table 7-1 indicates major milestone dates for the MPS. Items listed in Table 7-2 reflect the critical path activities/milestones for the PCEP. Table 7-3 lists near-critical activities on the horizon.

Notable Variances

BBII is currently reporting an overall delay to substantial completion, including the intermediate milestone of Segment 4/Test Track completion. The projected dates for these milestones remain the same as reported last month. The delay is primarily due to the time it has taken to finalize the modifications required for the grade crossings. JPB continues to work with BBII to mitigate the delay.

Table 7-1 Schedule Status

Milestones	Program Plan	Progress Schedule (November 2018)[1]
Segment 4 Completion to Begin Vehicle Testing	11/21/2019	02/06/2020[2]
Arrival of First Vehicle at JPB	07/29/2019	07/15/2019
Electrification Substantial Completion	08/10/2020	06/23/2021[2]
PG&E Final Design and Construction to provide Permanent Power Complete	09/09/2021	09/09/2021
Start Pre-Revenue Testing	09/10/2021	09/10/2021
RSD (w/o Risk Contingency)	12/09/2021	12/09/2021
RSD (w/ Risk Contingency)	04/22/2022	04/22/2022
FFGA RSD	08/22/2022	08/22/2022

Note:

1. Dates may shift slightly as the update of this month's Progress Schedule is still in progress.
2. See "Notable Variances" above for explanation on date shift.

Table 7-2 Critical Path Summary

Activity	Start	Finish
PG&E Final Design and Construction to provide Permanent Power	April 2016	09/09/2021
Pre-Revenue Testing	09/10/2021	12/09/2021
RSD w/out Risk Contingency[1]	12/09/2021	12/09/2021
RSD w/ Risk Contingency[1]	04/22/2022	04/22/2022

Note:

1. Milestone activity.

Table 7-3 Near-Term, Near-Critical with Less Than Three Months of Float

Work Breakdown Structure	Activity	Responsibility
Vehicles	EMU Manufacturing and Testing	Project Delivery
Electrification	TPS-1 Energized Testing and Integrated Testing	Project Delivery

8.0 BUDGET AND EXPENDITURES

The summary of overall budget and expenditure status for the PCEP is shown in the following tables. Table 8-1 reflects the Electrification budget, Table 8-2 reflects the EMU budget, and Table 8-3 reflects the overall project budget.

Table 8-1 Electrification Budget & Expenditure Status

Description of Work	Budget (A)	Current Budget (B)[1]	Cost This Month (C)[2]	Cost To Date (D)[3]	Estimate To Complete (E)	Estimate At Completion (F) = (D) + (E)
ELECTRIFICATION						
Electrification [4]	$696,610,558	$711,994,352	$5,896,385	$266,665,461	$445,328,892	$711,994,352
SCADA	$0	$3,446,917	$0	$1,934,371	$1,512,546	$3,446,917
Tunnel Modifications	$11,029,649	$42,415,935	$3,616,905	$10,744,901	$31,671,034	$42,415,935
Real Estate	$28,503,369	$28,503,369	$165,913	$16,244,667	$12,258,702	$28,503,369
Private Utilities	$63,515,298	$94,051,380	$1,618,710	$30,383,538	$63,667,843	$94,051,380
Management Oversight [5]	$141,506,257	$140,287,524	$2,125,374	$99,369,982	$40,917,542	$140,287,524
Executive Management	$7,452,866	$6,214,226	$162,931	$5,602,411	$611,815	$6,214,226
Planning	$7,281,997	$7,281,997	$2,738	$5,456,436	$1,825,561	$7,281,997
Community Relations	$2,789,663	$2,789,663	$4,426	$1,309,856	$1,479,807	$2,789,663
Safety & Security	$2,421,783	$2,421,783	$87,337	$1,831,383	$590,400	$2,421,783
Project Management Services	$19,807,994	$19,807,994	$101,710	$10,172,910	$9,635,084	$19,807,994
Engineering & Construction	$11,805,793	$11,805,793	$331,452	$5,591,683	$6,214,110	$11,805,793
Electrification Eng & Mgmt	$50,461,707	$50,461,707	$1,097,312	$32,368,523	$18,093,185	$50,461,707
IT Support	$312,080	$331,987	$6,248	$369,381	($37,394)	$331,987
Operations Support	$1,445,867	$1,445,867	$38,202	$1,019,927	$425,941	$1,445,867
General Support	$4,166,577	$4,166,577	$111,252	$3,577,790	$588,787	$4,166,577
Budget / Grants / Finance	$1,229,345	$1,229,345	$43,283	$1,040,784	$188,561	$1,229,345
Legal	$2,445,646	$2,445,646	$72,301	$3,230,423	($784,777)	$2,445,646
Other Direct Costs	$5,177,060	$5,177,060	$66,184	$3,090,597	$2,086,463	$5,177,060
Prior Costs 2002 - 2013	$24,707,878	$24,707,878	$0	$24,707,878	$0	$24,707,878
TASI Support	$55,275,084	$55,275,084	$1,335,213	$16,389,192	$38,885,892	$55,275,084
Insurance	$3,500,000	$4,305,769	$127,762	$3,558,530	$747,238	$4,305,769
Environmental Mitigations	$15,798,320	$14,972,644	$0	$712,000	$14,260,644	$14,972,644
Required Projects	$17,337,378	$15,252,378	$11,351	$675,372	$14,577,006	$15,252,378
Maintenance Training	$1,021,808	$1,021,808	$0	$0	$1,021,808	$1,021,808
Finance Charges	$5,056,838	$5,056,838	$109,208	$2,812,753	$2,244,085	$5,056,838
Contingency	$276,970,649	$199,541,210	$0	$0	$165,153,892	$165,153,892
Forecasted Costs and Changes	$0	$0	$0	$0	$34,387,318	$34,387,318
ELECTRIFICATION SUBTOTAL	**$1,316,125,208**	**$1,316,125,208**	**$15,006,821**	**$449,490,766**	**$866,634,442**	**$1,316,125,208**

Notes regarding tables above:

1. "Current Budget" includes executed change orders and awarded contracts.
2. Column C "Cost This Month" represents the cost of work performed this month.
3. Column D "Cost To Date" includes actuals (amount paid) and accruals (amount of work performed) to date.
4. Cost To Date for "Electrification" includes 5% for Contractor's retention until authorization of retention release.
5. The agency labor is actual through October 2018 and accrued for November 2018.

Table 8-2 EMU Budget & Expenditure Status

Description of Work	Budget (A)	Current Budget (B)[1]	Cost This Month (C)[2]	Cost To Date (D)[3]	Estimate To Complete (E)	Estimate At Completion (F) = (D) + (E)
EMU	$550,899,459	$550,792,469	$0	$97,153,105	$453,639,364	$550,792,469
CEMOF Modifications	$1,344,000	$1,344,000	$0	$0	$1,344,000	$1,344,000
Management Oversight [4]	$64,139,103	$63,379,937	$654,056	$31,955,517	$31,424,420	$63,379,937
Executive Management	$5,022,302	$4,263,136	$86,112	$3,511,337	$751,799	$4,263,136
Community Relations	$1,685,614	$1,685,614	$12,427	$488,986	$1,196,628	$1,685,614
Safety & Security	$556,067	$556,067	$15,485	$396,611	$159,457	$556,067
Project Mgmt Services	$13,275,280	$13,275,280	$62,338	$6,678,298	$6,596,982	$13,275,280
Eng & Construction	$89,113	$89,113	$0	$23,817	$65,296	$89,113
EMU Eng & Mgmt	$32,082,556	$32,082,556	$324,003	$14,944,213	$17,138,344	$32,082,556
IT Support	$1,027,272	$1,027,272	$3,829	$446,736	$580,536	$1,027,272
Operations Support	$1,878,589	$1,878,589	$0	$277,200	$1,601,388	$1,878,589
General Support	$2,599,547	$2,599,547	$50,549	$1,567,134	$1,032,413	$2,599,547
Budget / Grants / Finance	$712,123	$712,123	$25,629	$604,706	$107,418	$712,123
Legal	$1,207,500	$1,207,500	$37,139	$1,137,451	$70,049	$1,207,500
Other Direct Costs	$4,003,139	$4,003,139	$36,545	$1,879,029	$2,124,110	$4,003,139
TASI Support	$2,740,000	$2,740,000	$0	$0	$2,740,000	$2,740,000
Required Projects	$4,500,000	$4,500,000	$0	$270,000	$4,230,000	$4,500,000
Finance Charges	$1,941,800	$1,941,800	$66,934	$1,723,945	$217,855	$1,941,800
Contingency	$38,562,962	$39,429,118	$0	$0	$38,493,118	$38,493,118
Forecasted Costs and Changes	$0	$0	$0	$0	$936,000	$936,000
EMU SUBTOTAL	**$664,127,325**	**$664,127,325**	**$720,990**	**$131,102,568**	**$533,024,757**	**$664,127,325**

Notes regarding tables above:
1. "Current Budget" includes executed change orders and awarded contracts.
2. Column C "Cost This Month" represents the cost of work performed this month.
3. Column D "Cost To Date" includes actuals (amount paid) and accruals (amount of work performed) to date.
4. The agency labor is actual through October 2018 and accrued for November 2018.

Table 8-3 PCEP Budget & Expenditure Status

Description of Work	Budget (A)	Current Budget (B)[1]	Cost This Month (C)[2]	Cost To Date (D)[3]	Estimate To Complete (E)	Estimate At Completion (F) = (D) + (E)
Electrification Subtotal	**$1,316,125,208**	**$1,316,125,208**	**$15,006,821**	**$449,490,766**	**$866,634,442**	**$1,316,125,208**
EMU Subtotal	**$664,127,325**	**$664,127,325**	**$720,990**	**$131,102,568**	**$533,024,757**	**$664,127,325**
PCEP TOTAL	**$1,980,252,533**	**$1,980,252,533**	**$15,727,811**	**$580,593,334**	**$1,399,659,199**	**$1,980,252,533**

Notes regarding tables above:
1. Column B "Current Budget" includes executed change orders and awarded contracts.
2. Column C "Cost This Month" represents the cost of work performed this month.
3. Column D "Cost To Date" includes actuals (amount paid) and accruals (amount of work performed) to date.

Appendix D includes costs broken down by Standard Cost Code (SCC) format. This format is required for reporting of costs to the FTA. The overall project total in the SCC format is lower than the project costs in table 8-3. This is due to the exclusion of costs incurred prior to the project entering the Project Development phase.

9.0 CHANGE MANAGEMENT

The change management process establishes a formal administrative work process associated with the initiation, documentation, coordination, review, approval and implementation of changes that occur during the design, construction or manufacturing of the PCEP. The change management process accounts for impacts of the changes and ensures prudent use of contingency.

Currently the four PCEP contracts are BBII, Stadler, Tunnel Modification and SCADA. Future PCEP contracts such as CEMOF Modifications will also follow the change management process.

A log of all executed change orders can be found in Appendix E.

Executed Contract Change Orders (CCO) This Month

Electrification Contract

Change Order Authority (5% of BBII Contract) **5% x $696,610,558 = $34,830,528**

Date	Change Number	Description	CCO Amount	Change Order Authority Usage
	None		$0	$0
		Total	**$0**	**$0**

[1] (When indicated) Change approved by the Board of Directors – not counted against the Executive Director's Change Order Authority.

EMU Contract

Change Order Authority (5% of Stadler Contract) **5% x $550,899,459 = $27,544,973**

Date	Change Number	Description	CCO Amount	Change Order Authority Usage
	None		$0	$0
		Total	**$0**	**$0**

[1] (When indicated) Change approved by the Board of Directors – not counted against the Executive Director's Change Order Authority.

SCADA Contract

Change Order Authority (15% of ARINC Contract) **15% x $3,446,917 = $517,038**

Date	Change Number	Description	CCO Amount	Change Order Authority Usage
	None		$0	$0
		Total	**$0**	**$0**

[1] (When indicated) Change approved by the Board of Directors – not counted against the Executive Director's Change Order Authority.

Tunnel Modification Contract

Change Order Authority (10% of ProVen Contract)[2] **10% x $38,477,777 = $3,847,778**

Date	Change Number	Description	CCO Amount	Change Order Authority Usage
	None		$0	$0
		Total	**$0**	**$0**

[1] (When indicated) Change approved by the Board of Directors – not counted against the Executive Director's Change Order Authority.
[2] Tunnel modification contract ($38,477,777) includes: Notching ($25,281,170) and Drainage ($13,196,607).

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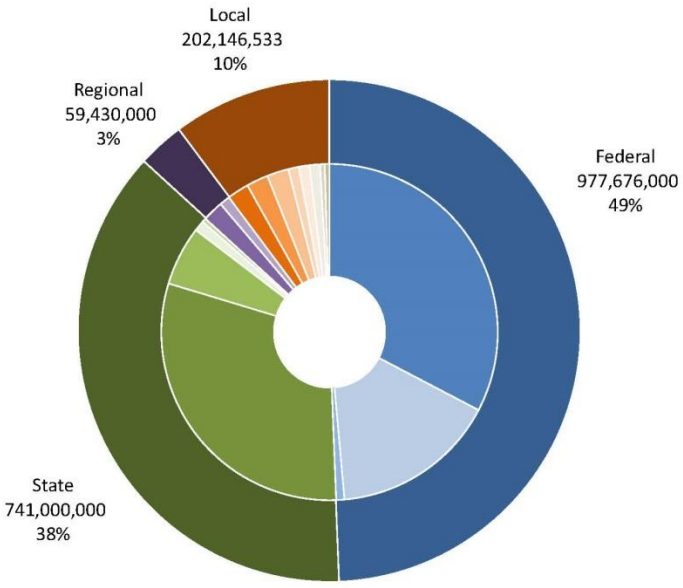
10.0 FUNDING

Figure 10-1 depicts a summary of the funding plan for the PCEP. It provides a breakdown of the funding partners as well as the allocated funds. As previously noted, the JPB received approval of the FFGA from the FTA in May 2017. The Agreement provides the project with a commitment of $647 million in federal funding. As previously reported, the FTA released the Fiscal Year 2018 apportionments, which includes the $100 million in Core Capacity funding. These funds were successfully awarded to the project in September. Additionally, the MTC has programmed $73 million of its commitment of FTA formula funds to the project. The JPB is working with FTA region IX staff to ensure the formula funds are made available to the project.

Figure 10-1 Funding Plan



Fund Source	Amount	%
FTA Core Capacity	$647,000,000	32.67%
FTA Section 5307 (EMU only)*	$315,000,000	15.91%
FTA Section 5307 (Environmental / Pre Development only)	$15,676,000	0.79%
Prop 1A	$600,000,000	30.30%
High Speed Rail Cap and Trade	$113,000,000	5.71%
Transit & Intercity Rail Capital Program	$20,000,000	1.01%
Prop 1B (Public Transportation Modernization & Improvement Account)	$8,000,000	0.40%
Bridge Toll Funds (RM1/RM2)	$39,430,000	1.99%
Carl Moyer	$20,000,000	1.01%
SFCTA/SFMTA**	$41,382,178	2.09%
SMCTA Measure A	$41,382,178	2.09%
VTA Measure A	$41,382,177	2.09%
Santa Clara (VTA) 7-Party MOU Contribution	$20,000,000	1.01%
San Francisco 7-Party MOU Contribution	$20,000,000	1.01%
San Mateo (SMCTA) 7-Party MOU Contribution	$20,000,000	1.01%
Caltrain Low Carbon Transit Operations Cap and Trade	$9,000,000	0.45%
Prior Local Contribution	$9,000,000	0.45%
Total	**$1,980,252,533**	

Notes:
*Includes necessary fund transfer with SMCTA
**Includes $4M CMAQ Transfer considered part of SF local contribution

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11.0 RISK MANAGEMENT

The risk management process is conducted in an iterative fashion throughout the life of the project. During this process, new risks are identified, other risks are resolved or managed, and potential impacts and severity modified based on the current situation. The Risk Management team's progress report includes a summary on the effectiveness of the Risk Management Plan, any unanticipated effects, and any correction needed to handle the risk appropriately.

The Risk Management team meets monthly to identify risks and corresponding mitigation measures. Each risk is graded based on the potential cost and schedule impacts they could have on the project. This collection of risks has the greatest potential to affect the outcome of the project and consequently is monitored most closely. For each of the noted risks, as well as for all risks on the risk register, mitigation measures have been identified and are being implemented. Progress in mitigating these risks is confirmed at monthly risk assessment meetings attended by project team management and through continuous monitoring of the Risk Management Lead.

The team has identified the following items as top risks for the project (see Appendix F for the complete Risk Table):

1. BBII may be unable to develop grade crossing modifications that meet regulatory requirements prior to scheduled testing and commissioning of the system.
2. A complex and diverse collection of major program elements and current Caltrain capital projects may not be successfully integrated with existing operations and infrastructure.
3. Track access may not meet expectations contributing to a prolonged construction schedule.
4. Potential that modifications to the PTC database and signal software are not completed in time for cutover and testing.
5. Changes to PTC implementation schedule could delay completion of the electrification work. Cost and schedule of BBII contract could increase as a result of change in PTC system.
6. Number of staff requested of TASI may be insufficient.
7. Property may not be acquired in time for contractor to do work.
8. Contractor may not be able to complete tunnel work within contractual requirement to complete within the 28 scheduled weekends due to the extent and complexity of the work and need to coordinate civil/structural work with electrical work.
9. May not have a 110-mph electrified section of track that will be ready for testing for final acceptance of vehicle.

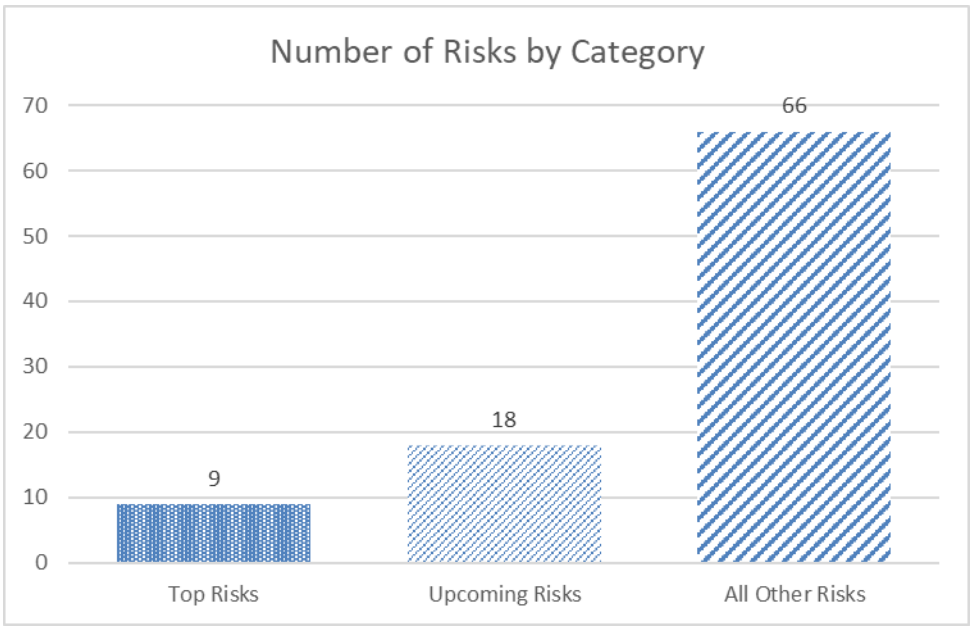
Activity This Month

- Updates were made to risk descriptions, effects, and mitigations based upon weekly input from risk owners. Monthly cycle of risk updating was completed based on schedules established in the Risk Identification and Mitigation Plan.
- Risk retirement dates were updated based upon revisions to the project schedule and input from risk owners.

- Continued weekly monitoring of risk mitigation actions and publishing of the risk register.
- The Risk Management team attended Project Delivery, Electrification, and Systems Integration meetings to monitor developments associated with risks and to identify new risks.
- Conducted monthly Risk Assessment Committee meeting.

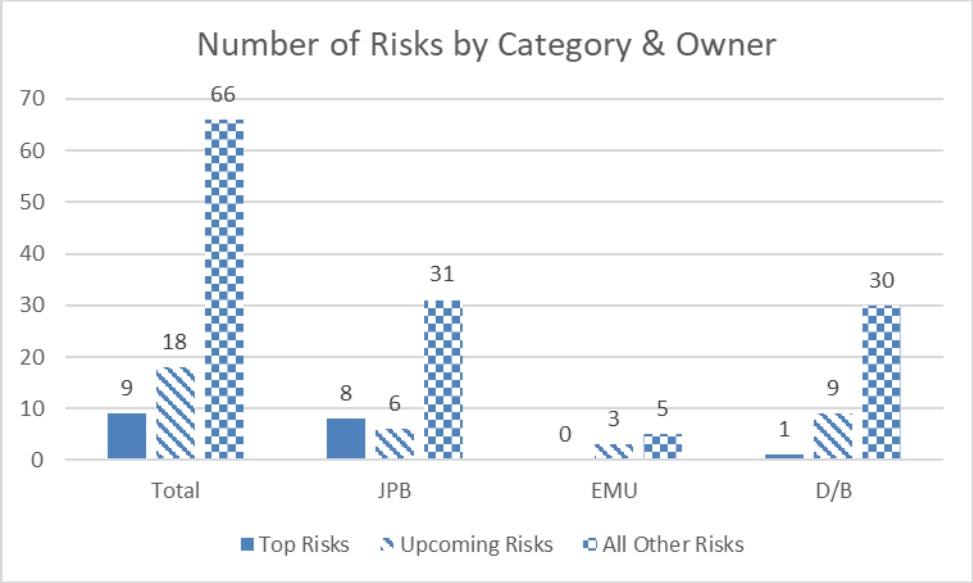
Figures 11-1 and 11-2 show the risks identified for the program. Risks are categorized as top risk, upcoming risk, and all other risks. The categories are based on a rating scale composed of schedule and cost factors. Top risks are considered to have a significantly higher than average risk grade. Upcoming risks are risks for which mitigating action must be taken within 60 days. All other risks are risks not falling into other categories.

Figure 11-1 Monthly Status of Risks



Total Number of Active Risks = 93

Figure 11-2 Risk Classification



Total Number of Active Risks = 93

Activity Next Month

- Conduct weekly monitoring of risk mitigation actions and continue publishing risk register.
- Update risk descriptions, effects, mitigations and retirement dates based on weekly monitoring and attendance at key project meetings.
- Continue coordination with contractor on Contractor Risk Management Program.
- Conduct Risk Assessment Committee meeting.
- Conduct risk refresh workshop for EMU-related risks.

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12.0 ENVIRONMENTAL

12.1. Permits

The PCEP has obtained the required environmental permits from the following agencies/federal regulations: Section 106 of the National Historic Preservation Act of 1966 (NHPA), Section 7 of the Endangered Species Act (ESA), United States Army Corps of Engineers, San Francisco Bay Regional Water Quality Control Board (SFWQCB), the California Department of Fish and Wildlife, and the San Francisco Bay Conservation Development Commission.

Activity This Month

- None

Activity Next Month

- None

12.2. Mitigation Monitoring and Reporting Program (MMRP)

The California Environmental Quality Act (CEQA) requires that a Lead Agency establish a program to monitor and report on mitigation measures that it has adopted as part of the environmental review process. The PCEP team has prepared a MMRP to ensure that mitigation measures identified in the PCEP Environmental Impact Report are fully implemented during project implementation. PCEP will implement the mitigation measures through its own actions, those of the DB contractor and actions taken in cooperation with other agencies and entities. The status of each mitigation measure in the MMRP is included in Appendix G.

Activity This Month

- Environmental compliance monitors were present during project activities (OCS pole foundation installation, OCS pole setting, potholing for utility location, ductbank installation, tree trimming/removal, staging area development, conduit installation, concrete and asphalt demolition, installation of OCS bridge attachments, directional boring under tracks, clearing and grubbing, grading, etc.) occurring in areas that required monitoring. The monitoring was conducted in accordance with measures in the MMRP in an effort to minimize potential impacts on sensitive environmental resources.
- Tree trimming and removal in Segments 2, 3, and 4.
- Noise and vibration monitoring also occurred during project activities, and non-hazardous soil was removed from the right of way (ROW).
- Environmentally Sensitive Area (ESA) staking and/or fencing occurred to delineate jurisdictional waterways and other potentially sensitive areas that should be avoided during upcoming construction activities, and wildlife exclusion fencing installation and monitoring occurred adjacent to portions of the alignment designated for wildlife exclusion fencing.

- Silt fencing installation, as well as the installation of straw wattles and soil covers, occurred at equipment staging areas and other work areas throughout the alignment in accordance with the project-specific Stormwater Pollution Prevention Plan.
- An Historic American Engineering Record (HAER) was prepared to document Portals for Tunnels 3 and 4.

Activity Next Month

- Environmental compliance monitors will continue to monitor project activities occurring in areas that require monitoring in an effort to minimize potential impacts on sensitive environmental resources in accordance with the MMRP. This will include environmental compliance monitoring of construction activity at the portals of Tunnels 3 and 4.
- Noise and vibration monitoring of project activities will continue to occur and non-hazardous soil will continue to be removed.
- Tree trimming and removal will continue in Segments 2, 3, and 4.
- Biological surveyors will continue to conduct pre-construction surveys for sensitive wildlife species ahead of project activities.
- Silt fencing installation will continue.
- ESA staking will continue to occur to delineate jurisdictional waterways and other potentially sensitive areas that should be avoided during upcoming project activities.
- Wildlife exclusion fencing will continue to be installed prior to upcoming construction activities adjacent to potentially suitable habitat for sensitive wildlife species.
- Preparation of the Sea Level Rise Vulnerability Assessment and Sea Level Rise Adaptation Plan is anticipated to be begin in the month of December.

13.0 UTILITY RELOCATION

Implementation of the PCEP requires relocation or rerouting of both public and private utility lines and/or facilities. Utility relocation will require coordination with many entities, including regulatory agencies, public safety agencies, federal, state, and local government agencies, private and public utilities, and other transportation agencies and companies. This section describes the progress specific to the utility relocation process.

Activity This Month

- Continued work with all utilities on review of overhead utility line relocations based on the current design.
- Continued individual coordination with utility companies on relocation plans and schedule for incorporation with Master Program Schedule.
- Continued coordination work with communications utilities on review of relocation design.
- Continued to work with Verizon on relocation of aerial fiber, including identification of potential temporary relocation requirements. Relocation is still scheduled to be completed by the end of 2018.
- Continued to work on relocation design review for PG&E and coordinate with PG&E on permitting and work planning.
- Perform relocation design review for Silicon Valley Power (SVP) and Palo Alto Power. Also begin coordination of work plans for the relocation.
- Continued coordination of relocation by communication cable owners such as AT&T and Comcast.
- Continued PG&E relocations in Segments 2 and 4.
- Continued to perform verifications for relocated PG&E facilities.
- Continue weekly utility coordination meeting to discuss overall status and areas of potential concern from the utilities.

Activity Next Month

- Continue to coordinate with utility owners on the next steps of relocations, including support of any required design information.
- Update the relocation schedule as information becomes available from the utility owners.
- Continue review of relocation design from PG&E, SVP, Palo Alto Power, and communications companies and coordinate relocation field work.
- Continue PG&E and communication relocations in Segments 2 and 4.
- Continue monthly and weekly utility meeting with utility owners.
- Continue coordination and scheduling with Verizon on relocation of aerial fiber.

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14.0 REAL ESTATE

The PCEP requires the acquisition of a limited amount of real estate. In general, Caltrain uses existing ROW for the PCEP, but in certain locations, will need to acquire small portions of additional real estate to expand the Right of Way (ROW) to accommodate installation of OCS supports (fee acquisitions or railroad easements) and associated Electrical Safety Zones (easements). There are two larger full acquisition areas required for wayside facilitates. The PCEP Real Estate team manages the acquisition of all property rights. Caltrain does not need to acquire real estate to complete the EMU procurement portion of the PCEP.

Of the parcels identified at the beginning of the project, there are only seven owners from whom the agency requires possession:

- One for which the appraisal has been completed and the offer is pending
    - BBII need date is October 2019
- Six that are in redesign
    - One parcel in Segment 2, needed ASAP
    - SS-1, needed in February 2019
    - Two parcels in Segment 3, needed in June 2019
    - Two parcels in Segment 4, needed in February 2019

The Real Estate team's current focus is working to identify new parcels and acquire them in conjunction with the project schedule.

- Staff has defined a process to ensure that BBII conveys new needs ASAP
    - BBII must justify and JPB must approve all new parcels
- Design needs to progress to enable BBII to identify exact acquisition areas
- Staff is conducting pre-acquisition activities as appropriate

JPB has approved three new parcels to date.

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15.0 THIRD PARTY AGREEMENTS

Third-party coordination is necessary for work impacting public infrastructure, utilities, ROW acquisitions, and others. Table 15-1 below outlines the status of necessary agreements for the PCEP.

Table 15-1 Third-Party Agreement Status

Type	Agreement	Third-Party	Status
Governmental Jurisdictions	Construction & Maintenance[1]	City & County of San Francisco	Executed
		City of Brisbane	Executed
		City of South San Francisco	Executed
		City of San Bruno	Executed
		City of Millbrae	Executed
		City of Burlingame	Executed
		City of San Mateo	Executed
		City of Belmont	Executed
		City of San Carlos	Executed
		City of Redwood City	Executed
		City of Atherton	In Process
		County of San Mateo	Executed
		City of Menlo Park	Executed
		City of Palo Alto	In Process
		City of Mountain View	Executed
		City of Sunnyvale	Executed
		City of Santa Clara	Executed
		County of Santa Clara	Executed
		City of San Jose	Executed
	Condemnation Authority	San Francisco	In Process
		San Mateo	Executed
		Santa Clara	Executed
Utilities	Infrastructure	PG&E	Executed
	Operating Rules	CPUC	Executed
Transportation & Railroad	Construction & Maintenance	Bay Area Rapid Transit	Executed[2]
	Construction & Maintenance	California Dept. of Transportation (Caltrans)	Not needed[3]
	Trackage Rights	UPRR	Executed[2]

Notes regarding table above:

1. Agreements memorialize the parties' consultation and cooperation, designate respective rights and obligations and ensure cooperation between the JPB and the 17 cities and three counties along the Caltrain ROW and within the PCEP limits in connection with the design and construction of the PCEP.
2. Utilizing existing agreements.
3. Caltrans Peer Process utilized. Formal agreement not needed.

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16.0 GOVERNMENT AND COMMUNITY AFFAIRS

The Community Relations and Outreach team coordinates all issues with all jurisdictions, partner agencies, government organizations, businesses, labor organizations, local agencies, residents, community members, other interested parties, and the media. In addition, the team oversees the BBII's effectiveness in implementing its Public Involvement Program. The following PCEP-related external affairs meetings took place this month:

Presentations/Meetings

- Redwood City Community Meeting
- Belmont Community Meeting
- Sunnyvale City Council Presentation
- Local Policy Maker Group
- City/County Staff Coordinating Group
- Caltrain Bicycle Advisory Committee

Third Party/Stakeholder Actions

- 65% OCS Foundation and Pole Layouts – Palo Alto
- 65% OCS Foundation and Pole Layouts – Menlo Park
- 65% OCS Foundation and Pole Layouts – Sunnyvale
- 65% Bridge Attachments Drawings – San Francisco
- 95% PS-6 Drawings – Sunnyvale
- Conformed Bridge Attachments Drawings – Santa Clara
- Conformed Bridge Attachment Drawings – San Jose

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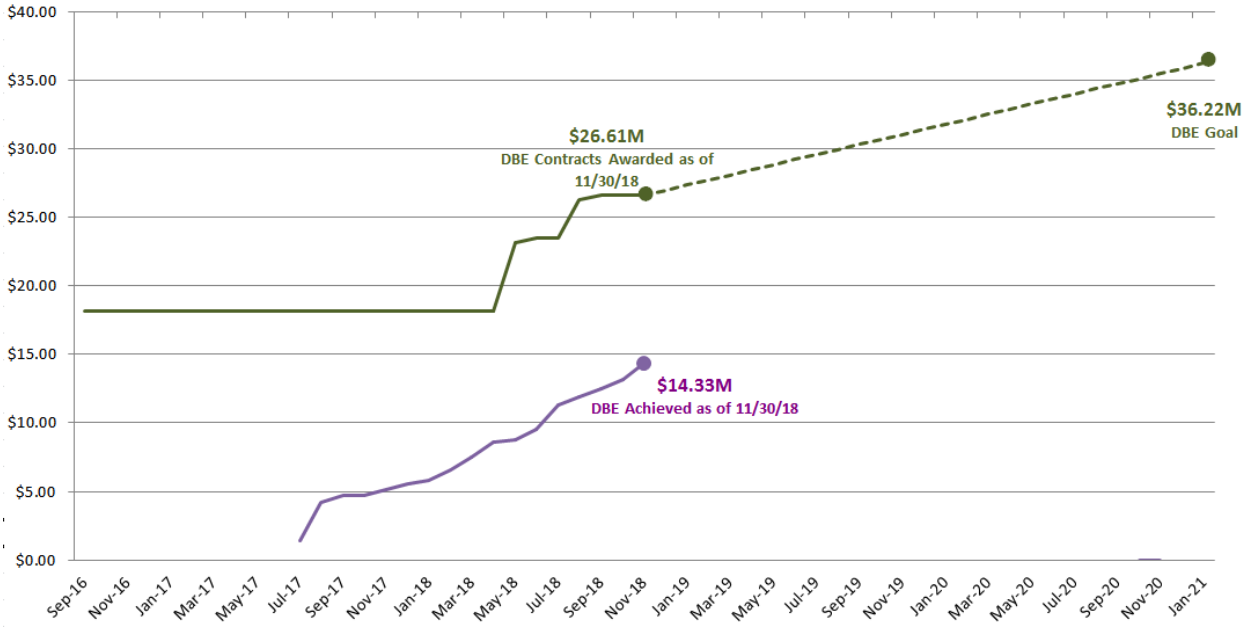
17.0 DISADVANTAGED BUSINESS ENTERPRISE (DBE) PARTICIPATION AND LABOR STATISTICS

BBII proposed that 5.2% of the total DB contract value (**$36,223,749**) would be subcontracted to DBEs. As expressed in Figure 17-1 below, to date:

- **$14,330,579** has been paid to DBE subcontractors.

Figure 17-1 DBE Participation



In order to reach the 5.2% DBE participation goal, BBII has proposed the following key actions:

"We continue to anticipate increasing our DBE commitments to firms who we are currently negotiating pricing on proposed work or Professional Services Agreements. We also anticipate that the existing project work will increase resulting in expanded work for current DBE subcontractors."

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18.0 PROCUREMENT

Invitation for Bids (IFB)/Request for Quotes (RFQ)/ Request for Proposals (RFP) Issued this Month:

- None

Bids, Quotes, Proposals in Response to IFB/RFQ/RFP Received this Month:

- None

Contract Awards this Month:

- RFP – 18-J-P-072 – On-Call Safety & Security Services for PCEP

Work Directive (WD)/Purchase Order (PO) Awards & Amendments this Month:

- Multiple WDs & POs issued to support the program needs

In Process IFB/RFQ/RFP/Contract Amendments:

- None

Upcoming Contract Awards:

- RFP – 18-J-P-115 – On-Call Construction Management Services for PCEP
- IFB – 18-J-C-071 – CEMOF Facility Modifications for PCEP

Upcoming IFB/RFQ/RFP to be Issued:

- RFQ – Manlifts

Existing Contracts Amendments Issued:

- IFB – 18-J-C-070 – Tunnel Modifications – OCS Option

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19.0 TIMELINE OF MAJOR PROJECT ACCOMPLISHMENTS

Below is a timeline showing major project accomplishments from 2001 to 2017:

Date	Milestone
2001	Began federal National Environmental Policy Act (NEPA) Environmental Assessment (EA) / state EIR clearance process
2002	Conceptual Design completed
2004	Draft NEPA EA/EIR
2008	35% design complete
2009	Final NEPA EA/EIR and Finding of No Significant Impact (FONSI)
2014	RFQ for electrification RFI for EMU
2015	JPB approves final CEQA EIR JPB approves issuance of RFP for electrification JPB approves issuance of RFP for EMU Receipt of proposal for electrification FTA approval of Core Capacity Project Development
2016	JPB approves EIR Addendum #1: PS-7 FTA re-evaluation of 2009 FONSI Receipt of electrification best and final offers Receipt of EMU proposal Application for entry to engineering to FTA Completed the EMU Buy America Pre-Award Audit and Certification Negotiations completed with Stadler for EMU vehicles Negotiations completed with BBII, the apparent best-value electrification firm JPB approves contract award (LNTP) to BBII JPB approves contract award (LNTP) to Stadler FTA approval of entry into engineering for the Core Capacity Program Application for FFGA
2017	FTA finalized the FFGA for $647 million in Core Capacity funding, met all regulatory requirements including end of Congressional Review Period (February) FTA FFGA executed, committing $647 million to the project (May) JPB approves $1.98 billion budget for PCEP (June) Issued NTP for EMUs to Stadler (June 1) Issued NTP for electrification contract to BBII (June 19) Construction began (August) EMU manufacturing began (October) Issued NTP for SCADA to Rockwell Collins (ARINC) (October) Issued NTP for CEMOF Facility Upgrades to HNTB (November)

Date	Milestone
2018	Completed all PG&E agreements
	JPB approves contract award to Mitsui for the purchase of electric locomotives and Amtrak for overhaul services, storage, acceptance testing, training, and shipment of locomotive to CEMOF
	JPB approves authorization for the Executive Director to negotiate final contract award to ProVen for tunnel modifications and track rehabilitation project
	JPB approves contract award (LNTP) to ProVen for tunnel modifications
	Issued NTP to ProVen for tunnel modifications (October)
	Amended contract with ProVen to include OCS in the tunnels (November)

APPENDICES

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Appendix A – Acronyms

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AIM	Advanced Information Management
ARINC	Aeronautical Radio, Inc.
BAAQMD	Bay Area Air Quality Management District
BBII	Balfour Beatty Infrastructure, Inc.
CAISO	California Independent System Operator
CalMod	Caltrain Modernization Program
Caltrans	California Department of Transportation
CDFW	California Department of Fish and Wildlife
CEMOF	Centralized Equipment Maintenance and Operations Facility
CEQA	California Environmental Quality Act (State)
CHSRA	California High-Speed Rail Authority
CIP	Capital Improvement Plan
CPUC	California Public Utilities Commission
CTC	Centralized Traffic Control
DB	Design-Build
DBB	Design-Bid-Build
DBE	Disadvantaged Business Enterprise
DEMP	Design, Engineering, and Management Planning
EA	Environmental Assessment
EAC	Estimate at Completion
EIR	Environmental Impact Report
EOR	Engineer of Record
EMU	Electric Multiple Unit
ESA	Endangered Species Act
ESA	Environmental Site Assessments
FAI	First Article Inspection
FEIR	Final Environmental Impact Report
FNTP	Full Notice to Proceed
FFGA	Full Funding Grant Agreement
FONSI	Finding of No Significant Impact
FRA	Federal Railroad Administration
FTA	Federal Transit Administration
GO	General Order
HSR	High Speed Rail
ICD	Interface Control Document
IFC	Issued for Construction
ITS	Intelligent Transportation System
JPB	Peninsula Corridor Joint Powers Board
LNTP	Limited Notice to Proceed
MMRP	Mitigation, Monitoring, and Reporting Program
MOU	Memorandum of Understanding

MPS	Master Program Schedule
NCR	Non Conformance Report
NEPA	National Environmental Policy Act (Federal)
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NTP	Notice to Proceed
OCS	Overhead Contact System
PCEP	Peninsula Corridor Electrification Project
PCJPB	Peninsula Corridor Joint Powers Board
PG&E	Pacific Gas and Electric
PHA	Preliminary Hazard Analysis
PMOC	Project Management Oversight Contractor
PS	Paralleling Station
PTC	Positive Train Control
QA	Quality Assurance
QC	Quality Control
QMP	Quality Management Plan
QMS	Quality Management System
RAMP	Real Estate Acquisition Management Plan
RE	Real Estate
RFI	Request for Information
RFP	Request for Proposals
RFQ	Request for Qualifications
ROCS	Rail Operations Center System
ROW	Right of Way
RRP	Railroad Protective Liability
RSD	Revenue Service Date
RWP	Roadway Worker Protection
SamTrans	San Mateo County Transit District
SCADA	Supervisory Control and Data Acquisition
SCC	Standard Cost Code
SPUR	San Francisco Bay Area Planning and Urban Research Association
SFBCDC	San Francisco Bay Conservation Development Commission
SFCTA	San Francisco County Transportation Authority
SFMTA	San Francisco Municipal Transportation Authority
SFRWQCB	San Francisco Regional Water Quality Control Board
SOGR	State of Good Repair
SS	Switching Station
SSCP	Safety and Security Certification Plan
SSMP	Safety and Security Management Plan
SSWP	Site Specific Work Plan
TASI	Transit America Services Inc.

TBD	**To Be Determined**
TPS	**Traction Power Substation**
TVA	**Threat and Vulnerability Assessment**
UPRR	**Union Pacific Railroad**
USACE	**United States Army Corp of Engineers**
USFWS	**U.S. Fish and Wildlife Service**
VTA	**Santa Clara Valley Transportation Authority**

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Appendix B – Funding Partner Meetings

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Funding Partner Meeting Representatives

Updated July 25, 2017

Agency	CHSRA	MTC	SFCTA/SFMTA/CCSF	SMCTA	VTA
FTA Quarterly Meeting	• Bruce Armistead • Boris Lipkin • Ian Ferrier (info only) • Wai Siu (info only)	• Anne Richman • Glen Tepke	• Luis Zurinaga	• April Chan • Peter Skinner	• Jim Lawson
Funding Partners Quarterly Meeting	• Bruce Armistead • Boris Lipkin • John Popoff	• Trish Stoops	• Luis Zurinaga	• April Chan • Peter Skinner	• Krishna Davey
Funding Oversight (monthly)	• Ben Tripousis • Kelly Doyle	• Anne Richman • Glen Tepke • Kenneth Folan	• Anna LaForte • Maria Lombardo • Luis Zurinaga • Monique Webster • Ariel Espiritu Santo	• April Chan • Peter Skinner	• Jim Lawson • Marcella Rensi • Michael Smith
Change Management Board (monthly)	• Bruce Armistead • Boris Lipkin	• Trish Stoops • Kenneth Folan	• Luis Zurinaga • Tilly Chang (info only)	• Joe Hurley	• Krishna Davey • Jim Lawson • Carol Lawson • Nuria Fernandez (info only)
Master Program Schedule Update (monthly)	• Ian Ferrier • Wai Siu	• Trish Stoops	• Luis Zurinaga	• Joe Hurley	• Jim Lawson
Risk Assessment Committee (monthly)	• Ian Ferrier • Wai Siu	• Trish Stoops	• Luis Zurinaga	• Joe Hurley	• Krishna Davey
PCEP Delivery Coordination Meeting (bi-weekly	• Ian Ferrier	• Trish Stoops	• Luis Zurinaga	• Joe Hurley	• Krishna Davey
Systems Integration Meeting (bi-weekly	• Ian Ferrier • Wai Siu	• Trish Stoops	• Luis Zurinaga	• Joe Hurley	• Krishna Davey

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Appendix C – Schedule

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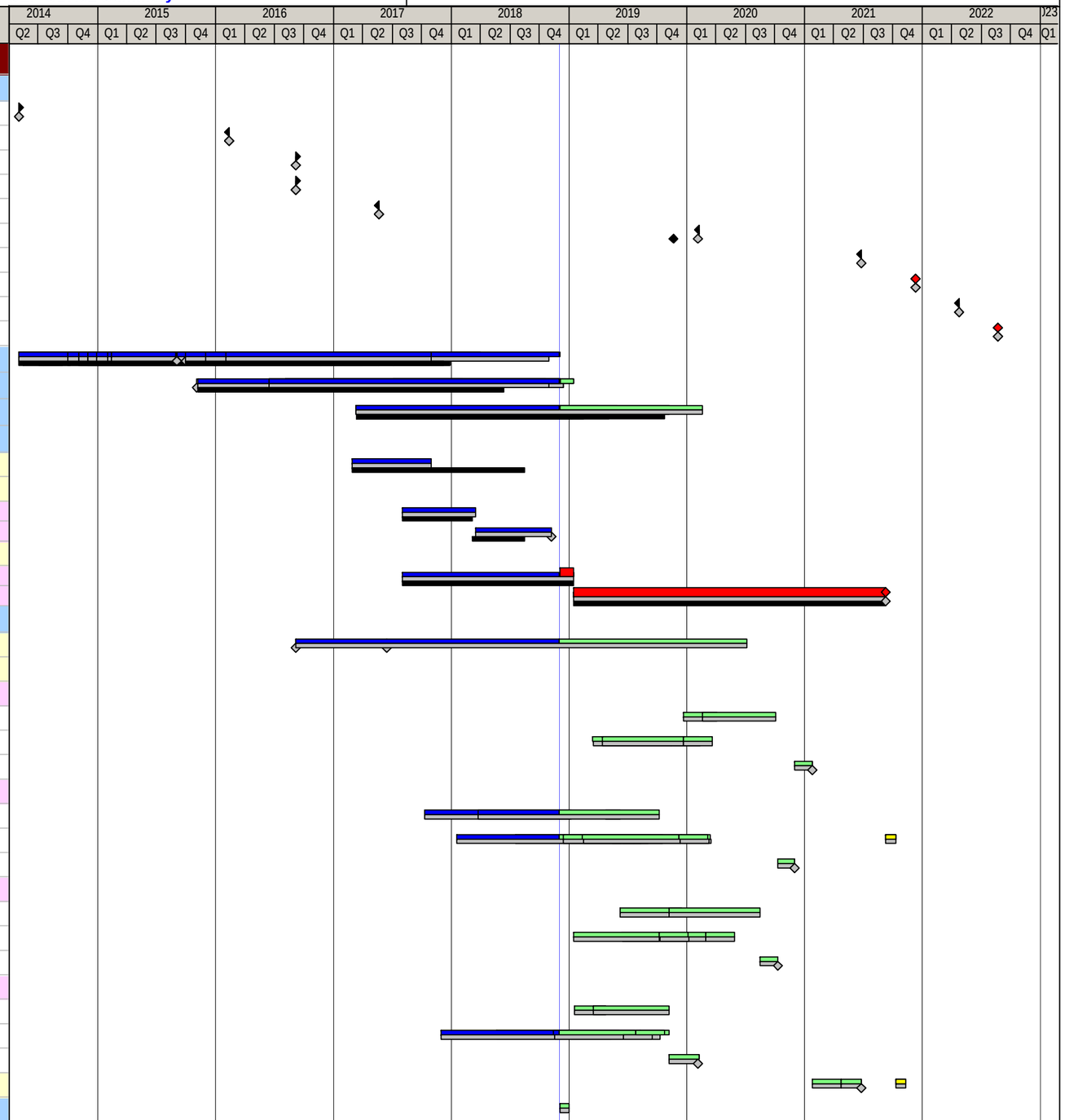
MASTER PROGRAM SCHEDULE C17.02 | **_PCEP C17.02 Summary** | FOR INTERNAL USE ONLY 12-17-18 10:32

#	Activity Name	Duration	Start	Finish
1	***MASTER PROGRAM SCHEDULE C17.02***	2168d	05-01-14 A	08-22-22
2	**MILESTONES**	2168d	05-01-14 A	08-22-22
3	Start	0d	05-01-14 A	
4	NEPA Reevaluation Complete	0d		02-11-16 A
5	LNTP to Electrification Contractor	0d	09-06-16 A	
6	LNTP to Vehicle Manufacturer	0d	09-06-16 A	
7	FTA Issues FFGA	0d		05-23-17 A
8	Segment 4 (incl. Test Track) Complete	0d		02-06-20
9	Electrification Substantial Completion	0d		06-23-21
10	Revenue Service Date (RSD) w/out Risk Contingency	0d		12-09-21
11	Revenue Service Date (RSD) w Risk Contingency (JPB Target)	0d		04-22-22
12	Revenue Service Date (RSD) w/ Risk Contingency (FFGA RSD)	0d		08-22-22
13	**PLANNING / APPROVALS**	1198d	05-01-14 A	12-03-18
14	**REAL ESTATE ACQUISITION**	809d	11-05-15 A	01-15-19
15	**OVERHEAD UTILITY RELOCATION (Various)**	746d	03-10-17 A	02-18-20
16	**PG&E INFRASTRUCTURE**	1151d	03-01-17 A	09-09-21
17	**INTERCONNECT (Feasibility Study)**	171d	03-01-17 A	10-31-17 A
18	**INTERIM POWER**	322d	08-01-17 A	11-05-18 A
19	***DESIGN & PERMITTING***	159d	08-01-17 A	03-16-18 A
20	***CONSTRUCTION***	164d	03-16-18 A	11-05-18 A
21	**PERMANENT POWER**	1044d	08-01-17 A	09-09-21
22	***DESIGN & PERMITTING***	369d	08-01-17 A	01-15-19
23	***CONSTRUCTION***	675d	01-16-19	09-09-21
24	**ELECTRIFICATION (BBII)**	1351d	09-06-16 A	11-09-21
25	**DESIGN**	999d	09-06-16 A	07-05-20
26	**CONSTRUCTION**	1463d	10-09-17 A	10-10-21
27	***Segment 1***	682d	03-14-19	01-24-21
28	**OCS**	287d	12-21-19	10-02-20
29	**Traction Power**	372d	03-14-19	03-19-20
30	**Segment Testing**	54d	12-01-20	01-24-21
31	***Segment 2***	1463d	10-09-17 A	10-10-21
32	**OCS**	729d	10-09-17 A	10-07-19
33	**Traction Power**	1361d	01-19-18 A	10-10-21
34	**Segment Testing**	54d	10-08-20	12-01-20
35	***Segment 3***	635d	01-13-19	10-08-20
36	**OCS**	435d	06-08-19	08-15-20
37	**Traction Power**	501d	01-13-19	05-27-20
38	**Segment Testing**	54d	08-16-20	10-08-20
39	***Segment 4***	798d	12-01-17 A	02-06-20
40	**OCS**	292d	01-18-19	11-05-19
41	**Traction Power**	706d	12-01-17 A	11-06-19
42	**Segment Testing**	92d	11-07-19	02-06-20
43	**TESTING**	290d	01-24-21	11-09-21
44	**DRILL TRACK (TASI)**	20d	12-03-18	12-31-18

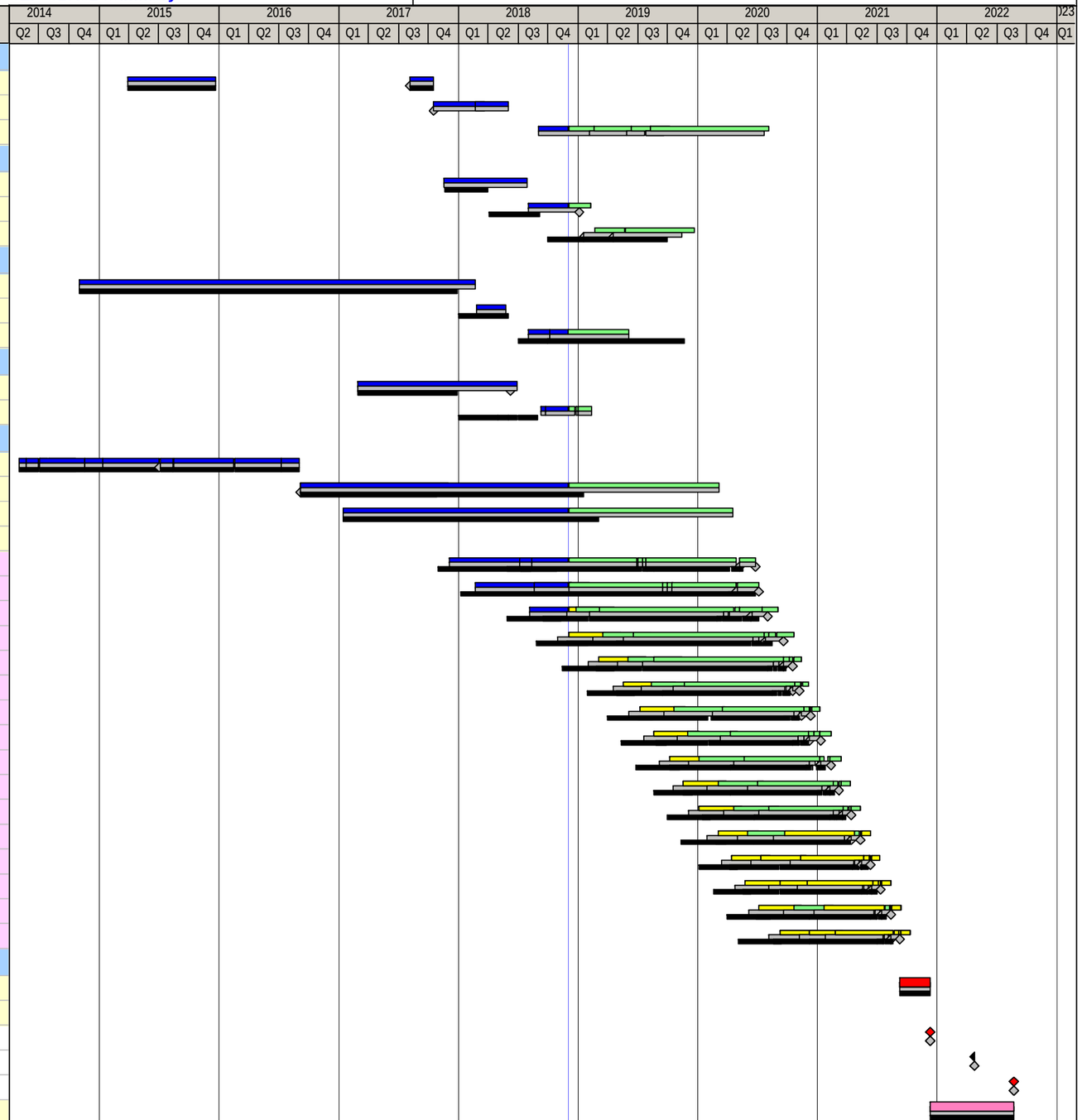


Actual Level of Effort | Progress | Critical | Prog Plan (C16.00) | Risk Contingency
Prog Plan (C16.00) | Remaining | Start Milestone | Last Months Update
Last Months Update | Near Critical | Finish Milestone | Critical Milestone

Filename: _C17.02 121318

Date	Revision	Checked	Approved
12/13/2018	Updates & Revisions Completed By A. Christofas		
12/17/2018	Checked By S. Iyer	x	

#	Activity Name	Duration	Start	Finish
45	**SCADA (Arinc)**	1362d	03-30-15 A	08-06-20
46	**PREPARE SOLE SOURCE & AWARD**	649d	03-30-15 A	10-16-17 A
47	**DESIGN**	157d	10-16-17 A	05-31-18 A
48	**IMPLEMENTATION, TEST, INSTALL & CUTOVER**	490d	09-04-18 A	08-06-20
49	**CEMOF (Ctr TBD)**	531d	11-16-17 A	12-20-19
50	**DESIGN**	178d	11-16-17 A	07-31-18 A
51	**BID & AWARD**	132d	08-01-18 A	02-07-19
52	**CONSTRUCTION**	211d	02-22-19	12-20-19
53	**TUNNEL MODIFICATION (ProVen)**	1197d	10-31-14 A	06-03-19
54	**DESIGN**	840d	10-31-14 A	02-22-18 A
55	**BID & AWARD**	66d	02-23-18 A	05-25-18 A
56	**CONSTRUCTION**	219d	08-01-18 A	06-03-19
57	**ELECTRIC LOCOMOTIVE (Amtrak / Mitsui)**	509d	03-01-17 A	02-12-19
58	**BID & AWARD**	348d	03-01-17 A	06-29-18 A
59	**REHAB / TEST/ TRAIN / SHIP**	107d	09-10-18 A	02-12-19
60	**EMU (Stadler)**	1942d	05-01-14 A	10-08-21
61	**DEVELOP RFP, BID & AWARD**	612d	05-01-14 A	09-02-16 A
62	**DESIGN**	913d	09-06-16 A	03-05-20
63	**PROCUREMENT (Material)**	849d	01-16-17 A	04-16-20
64	**MANUFACTURING & TESTING**	1005d	12-04-17 A	10-08-21
65	***TRAINSET 1***	668d	12-04-17 A	06-24-20
66	***TRAINSET 2***	617d	02-22-18 A	07-03-20
67	***TRAINSET 3***	543d	08-06-18 A	09-02-20
68	***TRAINSET 4***	493d	12-03-18	10-21-20
69	***TRAINSET 5***	445d	03-04-19	11-13-20
70	***TRAINSET 6***	405d	05-20-19	12-04-20
71	***TRAINSET 7***	395d	07-08-19	01-08-21
72	***TRAINSET 8***	388d	08-19-19	02-10-21
73	***TRAINSET 9***	375d	10-07-19	03-12-21
74	***TRAINSET 10***	365d	11-18-19	04-09-21
75	***TRAINSET 11***	352d	01-06-20	05-11-21
76	***TRAINSET 12***	334d	03-02-20	06-10-21
77	***TRAINSET 13***	325d	04-13-20	07-09-21
78	***TRAINSET 14***	317d	05-25-20	08-10-21
79	***TRAINSET 15***	310d	07-06-20	09-10-21
80	***TRAINSET 16***	285d	09-07-20	10-08-21
81	**TESTING & STARTUP (JPB)**	247d	09-10-21	08-22-22
82	**PRE-REVENUE TESTING**	63d	09-10-21	12-09-21
83	**REVENUE OPERATIONS**	180d	12-09-21	08-22-22
84	Revenue Service Date (RSD) w/out Risk Contingency	0d		12-09-21
85	Revenue Service Date (RSD) w Risk Contingency (JPB Target)	0d		04-22-22
86	Revenue Service Date (RSD) w/ Risk Contingency (FFGA RSD)	0d		08-22-22
87	**RISK CONTINGENCY**	256d	12-10-21	08-22-22



Actual Level of Effort | Progress | Critical | Prog Plan (C16.00) | Risk Contingency
Prog Plan (C16.00) | Remaining | Start Milestone | Last Months Update
Last Months Update | Near Critical | Finish Milestone | Critical Milestone

Filename: _C17.02 121318

Date	Revision	Checked	Approved
12/13/2018	Updates & Revisions Completed By A. Christofas		
12/17/2018	Checked By S. Iyer	x	

Appendix D – Standard Cost Codes

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Description of Work	Approved Budget (A)	Cost This Month (B)	Cost To Date (C)	Estimate To Complete (D)	Estimate At Completion (E) = (C) + (D)
10 - GUIDEWAY & TRACK ELEMENTS	**$27,781,170**	**$3,540,209**	**$10,390,226**	**$17,490,944**	**$27,881,170**
10.02 Guideway: At-grade semi-exclusive (allows cross-traffic)	$2,500,000	$0	$0	$2,600,000	$2,600,000
10.07 Guideway: Underground tunnel	$25,281,170	$3,540,209	$10,390,226	$14,890,943	$25,281,170
10.07 Allocated Contingency	$0	$0	$0	$0	$0
30 - SUPPORT FACILITIES: YARDS, SHOPS, ADMIN. BLDGS	**$2,265,200**	**$0**	**$0**	**$2,265,200**	**$2,265,200**
30.03 Heavy Maintenance Facility	$1,344,000	$0	$0	$1,344,000	$1,344,000
30.03 Allocated Contingency	$421,200	$0	$0	$421,200	$421,200
30.05 Yard and Yard Track	$500,000	$0	$0	$500,000	$500,000
40 - SITEWORK & SPECIAL CONDITIONS	**$267,064,916**	**$3,396,057**	**$85,871,139**	**$195,852,795**	**$281,723,934**
40.01 Demolition, Clearing, Earthwork	$3,077,685	$17,000	$1,804,000	$1,273,685	$3,077,685
40.02 Site Utilities, Utility Relocation	$92,728,599	$1,392,207	$28,006,106	$79,421,511	$107,427,617
40.02 Allocated Contingency	($0)	$0	$0	($0)	($0)
40.03 Haz. mat'l, contam'd soil removal/mitigation, ground water treatments	$2,200,000	$549,238	$549,238	$1,650,762	$2,200,000
40.04 Environmental mitigation, e.g. wetlands, historic/archeologic, parks	$32,679,208	$30,000	$979,125	$31,700,083	$32,679,208
40.05 Site structures including retaining walls, sound walls	$568,188	$0	$0	$568,188	$568,188
40.06 Pedestrian / bike access and accommodation, landscaping	$804,933	$0	$0	$764,933	$764,933
40.07 Automobile, bus, van accessways including roads, parking lots	$284,094	$0	$0	$284,094	$284,094
40.08 Temporary Facilities and other indirect costs during construction	$114,187,209	$1,407,612	$54,532,670	$59,854,538	$114,387,209
40.08 Allocated Contingency	$20,535,000	$0	$0	$20,335,000	$20,335,000
50 - SYSTEMS	**$519,289,544**	**$3,813,844**	**$52,224,010**	**$461,110,503**	**$513,334,513**
50.01 Train control and signals	$96,789,149	$1,323,231	$6,235,644	$93,248,023	$99,483,668
50.01 Allocated Contingency	$2,451,000	$0	$0	$0	$0
50.02 Traffic signals and crossing protection	$23,879,905	$0	$0	$23,879,905	$23,879,905
50.02 Allocated Contingency	$1,140,000	$0	$0	$1,140,000	$1,140,000
50.03 Traction power supply: substations	$70,984,821	$325,499	$12,525,416	$58,509,406	$71,034,821
50.03 Allocated Contingency	$28,150,860	$0	$0	$28,100,860	$28,100,860
50.04 Traction power distribution: catenary and third rail	$270,311,929	$2,165,114	$33,462,950	$240,522,928	$273,985,878
50.04 Allocated Contingency	$18,018,581	$0	$0	$8,146,081	$8,146,081
50.05 Communications	$5,455,000	$0	$0	$5,455,000	$5,455,000
50.07 Central Control	$2,090,298	$0	$0	$2,090,298	$2,090,298
50.07 Allocated Contingency	$18,000	$0	$0	$18,000	$18,000
60 - ROW, LAND, EXISTING IMPROVEMENTS	**$35,675,084**	**$165,913**	**$14,126,439**	**$21,548,646**	**$35,675,084**
60.01 Purchase or lease of real estate	$25,927,074	$165,613	$14,047,703	$11,879,371	$25,927,074
60.01 Allocated Contingency	$8,748,010	$0	$0	$8,748,010	$8,748,010
60.02 Relocation of existing households and businesses	$1,000,000	$300	$78,735	$921,265	$1,000,000
70 - VEHICLES (96)	**$625,755,807**	**$644,746**	**$123,195,807**	**$502,560,000**	**$625,755,807**
70.03 Commuter Rail	$588,301,135	$644,746	$122,925,807	$466,311,329	$589,237,135
70.03 Allocated Contingency	$10,550,740	$0	$0	$9,614,740	$9,614,740
70.06 Non-revenue vehicles	$8,140,000	$0	$270,000	$7,870,000	$8,140,000
70.07 Spare parts	$18,763,931	$0	$0	$18,763,931	$18,763,931
80 - PROFESSIONAL SERVICES (applies to Cats. 10-50)	**$328,451,444**	**$3,990,900**	**$240,667,416**	**$93,084,270**	**$333,751,686**
80.01 Project Development	$130,350	$0	$280,180	($149,830)	$130,350
80.02 Engineering (not applicable to Small Starts)	$185,495,676	$1,669,672	$175,891,634	$14,915,403	$190,807,037
80.02 Allocated Contingency	$435,919	$0	$0	$424,800	$424,800
80.03 Project Management for Design and Construction	$72,987,401	$1,541,533	$50,952,412	$22,034,988	$72,987,401
80.03 Allocated Contingency	$9,270,000	$0	$0	$9,270,000	$9,270,000
80.04 Construction Administration & Management	$22,557,063	$575,253	$6,216,745	$24,038,789	$30,255,534
80.04 Allocated Contingency	$20,657,886	$0	$0	$12,959,415	$12,959,415
80.05 Professional Liability and other Non-Construction Insurance	$4,305,769	$127,762	$3,558,530	$747,238	$4,305,769
80.06 Legal; Permits; Review Fees by other agencies, cities, etc.	$6,341,599	$72,301	$3,746,191	$2,595,408	$6,341,599
80.06 Allocated Contingency	$556,000	$0	$0	$556,000	$556,000
80.07 Surveys, Testing, Investigation, Inspection	$3,287,824	$4,378	$21,722	$3,266,101	$3,287,824
80.08 Start up	$1,797,957	$0	$0	$1,797,957	$1,797,957
80.08 Allocated Contingency	$628,000	$0	$0	$628,000	$628,000
Subtotal (10 - 80)	**$1,806,283,165**	**$15,551,669**	**$526,475,037**	**$1,293,912,357**	**$1,820,387,393**
90 - UNALLOCATED CONTINGENCY	**$117,389,131**	**$0**	**$0**	**$103,284,903**	**$103,284,903**
Subtotal (10 - 90)	**$1,923,672,296**	**$15,551,669**	**$526,475,037**	**$1,397,197,259**	**$1,923,672,296**
100 - FINANCE CHARGES	**$6,998,638**	**$176,142**	**$4,536,699**	**$2,461,939**	**$6,998,638**
Total Project Cost (10 - 100)	**$1,930,670,934**	**$15,727,811**	**$531,011,735**	**$1,399,659,199**	**$1,930,670,934**

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Appendix E – Change Order Logs

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Change Order Logs

Electrification Contract

Change Order Authority (5% of BBII Contract) **5% x $696,610,558 = $34,830,528**

Date	Change Number	Description	CCO Amount	Change Order Authority Usage[1]	Remaining Authority
08/31/17	BBI-053-CCO-001	Track Access Delays Q4 2016	$85,472	0.25%	$34,745,056
02/28/18	BBI-053-CCO-003	Deletion of Signal Cable Meggering (Testing)	($800,000)	(2.30%)	$35,545,056
02/21/18	BBI-053-CCO-004	Field Order for Differing Site Condition Work Performed on 6/19/17	$59,965	0.17%	$35,485,091
03/12/18	BBI-053-CCO-006	Track Access Delays for Calendar Quarter 1 2017	$288,741	0.83%	$35,196,350
04/24/18	BBI-053-CCO-002	Time Impact 01 Associated with Delayed NTP	$9,702,667	0.00%[2]	-
04/24/18	BBI-053-CCO-008	2016 Incentives (Safety, Quality, and Public Outreach)	$750,000	0.00%[2]	-
05/31/18	BBI-053-CCO-009	16th St. Grade Crossing Work Removal from BBII Contract	($685,198)	(1.97%)	$35,881,548
05/31/18	BBI-053-CCO-012	2017 Incentives (Safety, Quality, and Public Outreach)	$1,025,000	0.00%[2]	-
06/25/18	BBI-053-CCO-010	Pothole Change Of Shift	$300,000	0.86%	$35,581,548
06/25/18	BBI-053-CCO-013	Field Order for Signal Cable Relocation (FO# 31)	$95,892	0.28%	$35,485,656
06/25/18	BBI-053-CCO-015	TASI Pilot Transportation 2017	$67,345	0.19%	$35,418,311
06/26/18	BBI-053-CCO-005	Field Orders for Signal Cable Relocation (FO#s 26, 30)	$191,836	0.55%	$35,226,475
06/28/18	BBI-053-CCO-014	Field Orders for Signal Cable Relocation (FO-36 & FO-38)	$145,694	0.42%	$35,080,781
06/29/18	BBI-053-CCO-007	Track Access Delays for Calendar Quarter 2 2017	$297,512	0.85%	$34,783,269
06/29/18	BBI-053-CCO-011	Field Orders for Differing Site Condition (FO#s Partial 07A , 08-14)	$181,013	0.52%	$34,602,256
06/29/18	BBI-053-CCO-017	Field Order for NorCal Utility Potholing (FO# 27)	$93,073	0.27%	$34,509,183
06/29/18	BBI-053-CCO-018	Field Order for NorCal Utility Potholing (FO# 29)	$76,197	0.22%	$34,432,986
06/29/18	BBI-053-CCO-020	Field Orders for Differing Site Condition (FO#s 15-19)	$118,364	0.34%	$34,314,622
7/19/2018	BBI-053-CCO-019	Field Order for NorCal Utility Potholing (FO-032)	$88,956	0.26 %	$34,225,666
7/19/2018	BBI-053-CCO-021	As In-Service (AIS) Drawings for Segment 2 and 4 Signal Design (CN-009)	$105,000	0.30 %	$34,120,666
7/25/2018	BBI-053-CCO-022	CEMOF Yard Traction Power Feed (CN-008)	$332,700	0.96 %	$33,787,966
7/31/2018	BBI-053-CCO-028	Sonic Echo Impulse Testing	$4,541	0.01 %	$33,783,425
7/31/2018	BBI-053-CCO-026	TASI Pilot Transportation 2018 (CNC-0022)	$50,409	0.14%	$33,733,016
7/31/2018	BBI-053-CCO-027	Signal Cable Relocation (FOs-040 & 051)	$196,114	0.56%	$33,536,902
9/27/2018	BBI-053-CCO-030	Delete Spare 115k Disconnect Switches	($19,000)	(0.05)%	$33,555,902
9/28/2018	BBI-053-CCO-031	Bldg A HVAC and FOB Card Reader Systems	$76,500	0.22 %	$33,479,402
9/28/2018	BBI-053-CCO-025A	Addition of Shunt Wire at Transverse Utility Crossing Locations - Design	$925,000	2.66 %	$32,554,402
9/28/2018	BBI-053-CCO-016A	UPRR MT-1 Pole Relocation - Design Changes	$903,000	0.00%[2]	-
9/28/2018	BBI-053-CCO-024A	PG&E Utility Feed Connection to TPS#1 and TPS#2 (Design Only)	$727,000	0.00%[2]	-
		Total	**$15,383,793**	**6.53 %**	**$32,554,402**

Notes:

1. When the threshold of 75% is reached, staff may return to the Board to request additional authority.
2. Change approved by the Board of Directors – not counted against the Executive Director's Change Order Authority.

EMU Contract

Change Order Authority (5% of Stadler Contract) **5% x $550,899,459 = $27,544,973**

Date	Change Number	Description	CCO Amount	Change Order Authority Usage[1]	Remaining Authority
09/22/2017	STA-056-CCO 001	Contract General Specification and Special Provision Clean-up	$0	0.00%[2]	-
10/27/2017	STA-056-CCO 002	Prototype Seats and Special Colors	$55,000	0.20%	$27,489,973
11/02/2017	STA-056-CCO 003	Car Level Water Tightness Test	$0	0.00%[2]	-
12/05/2017	STA-056-CCO-004	Onboard Wheelchair Lift 800 Pound Capacity Provisions	$848,000	3.08%	$26,641,973
11/03/2017	STA-056-CCO 005	Design Progression (multiple)	$0	0.00%[2]	-
12/12/2017	STA-056-CCO 006	Prototype Seats and Special Colors	($27,500)	(0.10%)	$26,669,473
01/17/2018	STA-056-CCO 007	Multi-Color Destination Signs	$130,760	0.47%	$26,538,713
02/09/2018	STA-056-CCO-008	Adjustment to Delivery and LDs due to delayed FNTP	$490,000	0.00%[2]	-
02/12/2018	STA-056-CCO-009	Ship Cab Mock-up to Caltrain	$53,400	0.19%	$26,485,313
04/17/2018	STA-056-CCO-010	Onboard Wheelchair Lift Locations	($1,885,050)	(6.84%)	$28,370,363
04/17/2018	STA-056-CCO-011	Multiple Change Group 3 and Scale Models	$0	0.00%[2]	-
10/29/2018	STA-056-CCO-012	Multiple Change Group 4	$0	0.00%[2]	-
10/29/2018	STA-056-CCO-013	Wheelchair Lift Installation Redesign	$228,400	0.83%	$28,141,963
		Total	**($106,990)**	**(2.17%)**	**$28,141,963**

Notes:

1. When the threshold of 75% is reached, staff may return to the Board to request additional authority.
2. Change approved by the Board of Directors – not counted against the Executive Director's Change Order Authority.

SCADA Contract

Change Order Authority (15% of ARINC Contract) **15% x $3,446,917 = $517,038**

Date	Change Number	Description	CCO Amount	Change Order Authority Usage[1]	Remaining Authority
	None to date				
		Total	**$0**	**0.00%**	**$517,038**

Notes:

1. When the threshold of 75% is reached, staff may return to the Board to request additional authority.
2. Change approved by the Board of Directors – not counted against the Executive Director's Change Order Authority.

Tunnel Modifications Contract

Change Order Authority (10% of ProVen Contract) **10% x $55,077,777 = $5,507,778**

Date	Change Number	Description	CCO Amount	Change Order Authority Usage[1]	Remaining Authority
	None to date				
		Total	**$0**	**0.00%**	**$5,507,778**

Notes:

1. Tunnel modifications contract ($55,077,777) includes: Notching ($25,281,170), Drainage ($13,196,607) and OCS Installation ($16,600,000).
2. When the threshold of 75% is reached, staff may return to the Board to request additional authority.
3. Change approved by the Board of Directors – not counted against the Executive Director's Change Order Authority.

Appendix F – Risk Table

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Listing of PCEP Risks and Effects in Order of Severity

ID	RISK DESCRIPTION	EFFECT(S)
279	BBII may be unable to develop grade crossing modifications that meets stakeholder and regulatory requirements.	Crossing operations will not be acceptable to CPUC and FRA and therefore delay energization and commissioning.
223	A complex and diverse collection of major program elements and current Caltrain capital works projects may not be successfully integrated with existing operations and infrastructure.	Proposed changes resulting from electrification may not be fully and properly integrated into existing system. Rework resulting in cost increases and schedule delays
242	Track access may not meet expectations contributing to a prolonged construction schedule.	Contractor claims for delays, schedule delays and associated costs to owner's representative staff.
257	Potential that modifications to the PTC database and signal software are not completed in time for cutover and testing.	Failure to follow the DB Management process will result in major interruption to train service, possible violations and fines from FRA and overall capital projects delay.
298	Changes to PTC implementation schedule could delay completion of the electrification work. Cost and schedule of BBII contract could increase as a result of change in PTC system	1. Changes in datafiles could affect what Balfour provides; could delay timing for testing; could change books that FRA had to review. 2. Full integrated testing between EMU and wayside cannot be conducted without PTC in place. 3. Delays to completion of signal system could result in conflicts with PTC testing and PCEP construction and integrated testing. 4. Potential for track access impacts due to PTC testing.
209	Number of staff requested of TASI may be insufficient	• Testing delayed. Additional construction costs. • Change order for extended vehicle acceptance.
240	Property not acquired in time for contractor to do work. Property Acquisition not complete per contractor availability date <>Fee <>Easement <>Contract stipulates that if parcels are not available by contract date, there is only a delay if parcels are not available by the time contractor completes the Segment	• Potential delays in construction schedule

ID	RISK DESCRIPTION	EFFECT(S)
295	Contractor may not be able to complete tunnel work within contractual requirement to complete within the 28 scheduled weekends due to the extent and complexity of the work and need to coordinate civil/structural work with electrical work. • Contractor may not be able to complete notching and grouting work during 24 weekend shutdowns • Notching work could adversely affect radio communication equipment in the tunnels; solution to avoid impact may not be developed in time to implement. • Extent of grouting is unknown and work could require more grout than was initially budgeted. • Presence of bio-hazards and homeless population around the tunnels could interfere with the project.	Delays to completion of construction and associated claims costs.
302	May not have a 110-mph electrified section of track that will be ready for testing for final acceptance of vehicle.	Contract with Stadler implies readiness of Electrification Project and track upgrades for EMU testing Delays in testing may increase Caltrain costs.
241	Interim power may not be installed prior to scheduled date for testing and commissioning of OCS system.	Delay in testing and acceptance of OCS system resulting in increased costs
247	Timely resolution of 3rd party design review comments to achieve timely approvals	Delay to completion of design and associated additional labor costs.
263	Collaboration across multiple disciplines to develop a customized rail activation program may fail to comprehensively address the full scope of issues required to operate and maintain an electrified railroad and decommission the current diesel fleet.	Delay in testing of EMUs. Delay in Revenue Service Date. Additional costs for Stadler and BBII due to overall schedule delays.
267	Additional property acquisition is necessitated by design changes.	New project costs and delays to schedule.
268	Potential that vehicles will not receive timely notification of compliance from FRA. Most significant issues include: • High Level Doors in lieu of windows as emergency exits • Compliance with acceptable alternate crash management standards	Delays to completion of construction and additional cost to changes in design.
303	Delays in resolving differing site conditions delay completion of electrification.	Delay in potholing can lead to delays in readiness of the holes for foundation installation. This can lead to overall delay and additional cost due to the delay.

ID	RISK DESCRIPTION	EFFECT(S)
64	OCS conflicts may require additional ROW or relocation of underground utilities by others, which could result in delays to the schedule and associated costs.	Delay in installation of catenary poles resulting in claims and schedule delay CBOSS FOC conflicts additional costs and delays include: 1. Potholing 2. Design 3. OCS materials 4. Encasement 5. ROW JPB Signal Cable conflicts additional costs and delays include: 1. Trenching 2. Splicing 3. Cable
304	FRA has concerns in how bikes are placed on new EMUs.	Protracted negotiations with FRA to achieve original design
67	Relocation of overhead utilities must precede installation of catenary wire and connections to TPSs. Relocation work will be performed by others and may not be completed to meet BBII's construction schedule.	Delay in progress of catenary installation resulting in claims and schedule delay
115	Other capital improvement program projects compete with PCEP for track access allocation and requires design coordination (design, coordination, integration).	Schedule delay as resources are allocated elsewhere, won't get track time, sequencing requirements may delay PCEP construction, track access requirements must be coordinated.
136	UP reviews of BBI design may extend project duration.	Delays to completion of design and claims for delay.
174	Installation of electrification infrastructure may require the relocation of signals, which would affect the block design.	Cost and schedule impacts resulting from the design, construction, and testing of modified signal system and review of revised block design.
261	EMU electromechanical emissions and track circuit susceptibility are incompatible.	Changes on the EMU and/or signal system require additional design and installation time and expense.
276	BBII may be unable to get permits required by jurisdictions for construction in a timely manner.	Additional cost and time resulting from delays to construction
277	Inadequate D-B labor to support multiple work segments	Additional cost and time
280	Field equipment installed by D/B contractor may not communicate with the Central Control Facility (CCF), the Back-Up Central Control Facility (BCCF) through SCADA and function as designed.	Could require the acquisition and installation of additional equipment at BCCF and CCF. Could therefore require additional cost and time

ID	RISK DESCRIPTION	EFFECT(S)
281	Additional work in the form of signal/pole adjustments may be required to remedy sight distance impediments arising from modifications to original design.	Add repeater signals, design duct bank would result in increased design and construction costs.
285	Potential for inflation, (except with respect to Maintenance Option) to increase contractor costs.	Higher cost
286	Potential for wage escalation, (except for Maintenance Option) to increase contractor costs.	Higher cost
287	Design changes may necessitate additional implementation of environmental mitigations not previously budgeted.	Increased cost for environmental measures and delays to construct and overall delay in construction schedule
296	BBII needs to complete interconnection and traction power substations be sufficiently complete to accept interim power	Delay in testing and increased costs
297	Cost and schedule of Stadler contract could increase as a result of this change in PTC system Delay of PTC may delay acceptance of EMUs.	1) Full integrated testing between EMU and wayside cannot be conducted without PTC in place. 2) Delay in EMU final design for PTC and potential PTC interfaces. Need to finalize braking system sequence priority.
56	Lack of O&M support for testing and/or vehicle operations. Includes operational readiness and personnel hired and scheduled to be trained.	• Testing delayed. • Change order for extended vehicle acceptance.
88	Construction safety program fails to sufficiently maintain safe performance.	Work stoppages due to safety incidents resulting in schedule delay and additional labor costs.
161	Unanticipated costs to provide alternate service (bus bridges, etc.) during rail service disruptions.	Cost increase.
179	Risk that municipal reviews take additional time due to absence of municipal agreement or non-compliance with an agreement.	Possible delay to: (1) to design review; (2) permit issuance; (3) construction within local jurisdiction right-of-way
183	Installation and design of new duct bank takes longer because of UP coordination	Schedule - Delay. May need to use condemnation authority to acquire easement. Cost - Additional cost for PG&E to make connections increasing project costs

ID	RISK DESCRIPTION	EFFECT(S)
259	Work on 25th Avenue Grade Separation Project could delay Balfour construction schedule.	• Increased cost for BBI as catenary construction in this section was anticipated to be constructed under the 25th Avenue Grade Separation Project. • Potential delays in construction schedule • Risk is delay to BBI
270	OCS poles or structures as designed by Contractor fall outside of JPB row	Additional ROW Take, additional cost and time
294	UP does not accept catenary pole offsets from centerline of track necessitating further negotiation or relocation of poles	Delay to construction and additional costs for redesign and ROW acquisition.
82	Unexpected restrictions could affect construction progress: <> night work <> noise <> local roads <> local ordinances	• Reduced production rates. • Delay
119	Coordination of electrification design with Operations	• Qualified individuals may not be available. • Training may take longer than anticipated.
253	Risk that existing conditions of Caltrans-owned bridges will not support bridge barriers. The existing bridge conditions and structural systems are unknown and may not support mounting new work Design will need to prove new barriers will not impact existing capacity of the bridges prior to Caltrans's approval for construction. Without approval of design and issuance of permit, there is risk to the schedule for the work and also budget if during design existing bridge will require some upgrades due to the introduction of new attachments.	Delays to issuance of permit for construction while negotiating and executing an operation and maintenance agreement for equipment installed on bridges; existing bridge deficiencies could result in additional costs to PCEP.
78	Need for unanticipated, additional ROW for new signal enclosures.	Delay while procuring ROW and additional ROW costs.
154	Potential for encountering unidentified or unknown underground utility crossings along the corridor. Could impose unanticipated rights or requirements on the design.	Additional cost and time to acquire ROW by condemnation
171	Electrification facilities could be damaged during testing.	Delay in commencing electrified operations.

ID	RISK DESCRIPTION	EFFECT(S)
250	Potential for municipalities to request betterments as part of the electrification project.	Delay to project schedule in negotiating betterments as part of the construction within municipalities and associated increased cost to the project as no betterments were included in the project budget.
251	Subcontractor and supplier performance to meet aggressive schedule <>Potential issue meeting Buy America requirements	Delay to production schedule resulting in increased soft costs and overall project schedule delay.
265	PG&E must deliver interim power in time for Balfour testing	Delay in testing and increased costs
271	Need for additional construction easements beyond that which has been provided for Contractor proposed access and staging	Additional cost and time
272	Final design based upon actual Geotech conditions	Could require changes
288	Independent checker finds errors in signal design and technical submittals	Additional cost and time
289	Coordination and delivery of permanent power for power drops for everything except traction power substations along alignment	Can't test resulting in delays to schedule and associated additional project costs.
291	Order/manufacture of long lead items prior to 100% IFC design document that proves to be incorrect	Design change and/or delays
292	Potential that UPS will not fit in the spaces allotted to communications work within the buildings.	Requisite backup capacity units under design criteria could result in the need for larger unit than originally planned resulting in design and fabrication changes and associated schedule delays and costs.
19	Potential for vehicle delivery to be hampered by international conflict; market disruption; labor strikes at production facility.	Delay in production of vehicle with associated cost implications.
42	Full complement of EMUs not available upon initiation of electrified revenue service	Late delivery impacts revenue service date.
101	PG&E may not be able to deliver permanent power for the project within the existing budget and in accordance with the project schedule	Additional project costs; potential delay to revenue service date
150	Number of OCS pole installation is significant. Any breakdown in sequencing of operations or coordination of multiple crews will have a substantial effect on the project.	Delay.

ID	RISK DESCRIPTION	EFFECT(S)
245	Failure of BBI to submit quality design and technical submittals in accordance with contract requirements • $3-$5M/month burn rate for Owner's team during peak	Delays to project schedule and additional costs for preparation and review of submittals.
252	Failure of BBI to order/manufacture long lead items prior to 100% IFC design document approval by JPB	Delays to project schedule and additional cost for contractor and JPB staff time.
266	Relocation of Verizon must precede installation of foundations and connections to TPSs. Relocation work will be performed by others and may not be completed to meet BBII's construction schedule.	Delay in progress of catenary installation resulting in claims and schedule delay
306	Possible legal challenge and injunction to any changes in PCEP requiring subsequent CEQA or NEPA environmental clearance documentation/actions.	Worst case: a judge issues an injunction, which would prohibit any work ONLY on the project scope of the environmental document. Impact to the project from cost and schedule impact depends on if work is on the critical or becomes on the critical path.
10	Delays in parts supply chain result in late completion of vehicles.	• Delay in obtaining parts / components. • Cost increases. (See Owner for allocation of costs) • Schedule increase - 3 months (See Owner for allocation of damages associated with this Risk)
12	Potential for electromagnetic interference (EMI) to private facilities with sensitive electronic equipment caused by vehicles.	• Increased cost due to mitigation • Potential delay due to public protests or environmental challenge.
50	Leadership and / or key personnel changes with car builder results in delays to completion of design and manufacture of vehicles.	• Cost Increase • Schedule Increase – not supported by a TIA
51	Damage during delivery of first six EMUs.	Schedule delay
54	Infrastructure not ready for vehicles (OCS, TPS, Commissioning site / facility).	Increases cost if done off property
69	Potential need for additional construction easements. Especially for access and laydown areas. Contractor could claim project is not constructible and needs more easements after award.	Increased cost Delay
87	Unanticipated HazMat or contaminated hot spots encountered during foundation excavations for poles, TPSS, work at the yards.	Increased cost for clean-up and handling of materials and delay to schedule due to HazMat procedures.

ID	RISK DESCRIPTION	EFFECT(S)
93	Unanticipated subsurface conditions affecting pole or TPSS installation.	• Delay taking actions to remedy conditions or relocate foundations. • Increased cost for design and construction of remediation
106	Potential that DB contractor will have insufficient field resources (personnel or equipment) to maintain aggressive schedule. Multiple segments will need to be under design simultaneously. Labor pool issue. 32 qualified linemen will be needed. Potential there is not enough available. Big storm damage anywhere in US will draw from the pool to make line repairs. Possible shortages with other specialty crafts as well.	Delay.
146	Wayside signal / pole adjustments to avoid sighting distance problems.	Change order.
148	Potential impact to advancing construction within the vicinity of any cultural finds that are excavated.	Minor disruption of the construction work
151	Public could raise negative concerns regarding wheel/rail noise.	Increased cost to mitigate: <> grind rails <> reprofile wheels <> sound walls
182	Compliance with Buy America requirements for 3rd party utility relocations. <>Utility relocations covered under existing Caltrain agreements that require utilities to move that will not have effect on project cost - will not be Buy America <>Installation of new equipment inside PG&E substations that will provide all PG&E customers, about 1/6 of that provides power to our system - is upgrade that benefits all customers subject to Buy America requirements, is it 1/6th, or 100% <>Risk is substation not relocations <>Substation equipment is available domestically, has 6 month longer lead time and increased cost of 20%	• Increased cost • Delay

ID	RISK DESCRIPTION	EFFECT(S)
189	EMUs will need I-ITCS equipment that is compatible with wayside equipment. Same supplier thereby reducing the risk.	Could drive up price because the car builder may not be a priority customer.
192	Environmental compliance during construction. Failure to meet the commitments contained within the PCEP EA, FEIR and permit conditions	• Delay • Cost increase
195	Introduction of electrified train service will require training of first responders in working in and around the rail corridor. The new vehicles will be considerably quieter than the existing fleet and the presence of high voltage power lines will require new procedures for emergency response. A new training program will need to be developed and disseminated for: • Fire, police, and first responders • Local communities • Schools	Safety hazards resulting in incidents that delay construction and increase labor cost. Delays in RSD until training is completed as requirement of safety certification process.
237	JPB needs an agreement with each city in which catenary will be strung over an existing grade crossing (17 in all) under GO 88 (grade crossings). These agreements must be executed subsequent to installing overhead catenary. JPB is preparing a response to CPUC while working with the cities. Delays in reaching agreement could have impacts on schedule and budget.	Not completing the grade crossing diagnostics and getting agreement from the cities on the results can result in delays to necessary approvals for the project and revenue service.
244	Determine that there is sufficient storage for both EMU and Diesel fleets while maintaining Yard/Vehicle operability.	Potential delay in completion of Test & Commissioning due to vehicle movements & logistics
248	3rd party coordination <>Jurisdictions, Utilities, UP, Contractors <>D/B needs to provide timely information to facilitate 3rd party coordination <>Risk is for construction	Delays in approvals resulting in project schedule delays and associated costs.
249	Coordination and delivery of permanent power for power drops along alignment	Delays in completion of construction and testing with associated increase in costs.
254	Potential that bridge clearance data are inaccurate and that clearances are not sufficient for installation of catenary.	Results in additional design and construction to create sufficient clearance.
269	Potholing unearths the fact that pole locations conflict with utilities. OCS pole or structure locations as designed by Contractor conflict with utilities where conflict could have been avoided by allowable final design adjustments.	Additional cost and time

ID	RISK DESCRIPTION	EFFECT(S)
273	Contractor generates new hazardous materials, necessitates proper removal and disposal of existing hazardous materials identified in the Contract for D-B remediation.	Delay to construction while removing and disposing of hazardous materials resulting in schedule delay, increased construction costs, and schedule delay costs.
274	JPB as-built dwgs and existing infrastructure to be used as basis of final design and construction is not correct	Additional cleanup of as-builts after PCEP construction
275	DB fails to verify as-built dwgs and existing infrastructure	Additional cleanup of as-builts after PCEP construction
278	Failure of D/B contractor and subcontractors and suppliers to meet Buy America requirements	Delays while acceptable materials are procured and additional costs for delays and purchase of duplicative equipment.
282	Failure to maintain dynamic envelope and existing track clearances consistent with requirements.	Redesign entailing cost and schedule impacts.
283	Fluctuation in foreign currency v US dollar	Increase in costs
284	Compliance with project labor agreement could result in inefficiencies in staffing of construction.	Increase in labor costs and less efficient construction resulting in schedule delays.
290	Delays in agreement and acceptance of initial VVSC requirements database.	Delay to design acceptance
293	Readiness of 115kV interconnect for temporary power to support testing	Delay in testing

Appendix G – MMRP Status Log

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Mitigation Monitoring and Reporting

Mitigation Measure	Mitigation Timing				Status	Status Notes
	Pre-Construction	Construction	Post-Construction	Operation		
AES-2a: Minimize OCS construction activity on residential and park areas outside the Caltrain ROW.	**X**	**X**			Ongoing	The OCS proposed construction schedule has been provided to the JPB. OCS construction began the week of October 2, 2017. The D-B has used the potholing process to assist in locating conflicts in the 35% design and attempting to relocate OCS pole locations within the ROW, thereby avoiding parks and residential areas.
AES-2b: Aesthetic treatments for OCS poles, TPFs in sensitive visual locations, and Overbridge Protection Barriers.	**X**				Ongoing	The design requirements indicated in the measure have been implemented as described, and coordination with the specific jurisdictions regarding pole colors and design, TPFs, and Overbridge Protection Barriers, is ongoing.
AES-4a: Minimize spillover light during nighttime construction.		**X**			Ongoing	OCS construction began the week of October 2, 2017. The BBI community relations lead has notified nearby residents of upcoming construction. During construction, lighting is faced inward, towards the railroad tracks, and any complaints will be documented and addressed by the BBI community relations lead.
AES-4b: Minimize light spillover at TPFs.	**X**				Upcoming	The design requirements indicated in the measure are being used in the design process of the TPFs.
AQ-2a: Implement BAAQMD basic and additional construction mitigation measures to reduce construction-related dust.	**X**	**X**			Ongoing	The Dust Mitigation Plan was submitted to the JPB. The requirements in the Dust Mitigation Plan will be implemented throughout the construction period and documented in daily reports.

Mitigation Monitoring and Reporting

Mitigation Measure	Mitigation Timing				Status	Status Notes
	Pre-Construction	Construction	Post-Construction	Operation		
AQ-2b: Implement BAAQMD basic and additional construction mitigation measures to control construction-related ROG and NOX emissions.	**X**	**X**			Ongoing	The Equipment Emissions Control Plan was submitted to the JPB. The requirements in the Equipment Emissions Control Plan will be implemented throughout the construction period and documented in daily reports.
AQ-2c: Utilize clean diesel-powered equipment during construction to control construction-related ROG and NOX emissions.	**X**	**X**			Ongoing	The Equipment Emissions Control Plan was submitted to the JPB. The requirements in the Equipment Emissions Control Plan will be implemented throughout the construction period and documented in daily reports.
BIO-1a: Implement general biological impact avoidance measures.	**X**	**X**			Ongoing	Worker Environmental Awareness Training is provided to all project-related personnel before they work on the project. All measures as described will be implemented throughout the construction period and documented in daily reports.
BIO-1b: Implement special-status plant species avoidance and revegetation measures.	**X**	**X**	**X**		Complete	Not applicable. Subsequent habitat assessment and avoidance of Communication Hill eliminated any potential to affect special-status plant species. The measure is not needed.

Mitigation Monitoring and Reporting

Mitigation Measure	Mitigation Timing				Status	Status Notes
	Pre-Construction	Construction	Post-Construction	Operation		
BIO-1c: Implement California red-legged frog and San Francisco garter snake avoidance measures.	**X**	**X**			Ongoing	Pre-construction surveys are occurring no more than 7 days prior to the initiation of construction activities nearby/adjacent to potential habitat for CRLF and SFGS. The Wildlife Exclusion Fencing Plan for Segments 2 and 4 was submitted and approved by the wildlife agencies, and installation and monitoring of wildlife exclusion fencing is ongoing. No CRLF / SFGS or sign of each species has been observed to date on the Project. A separate Wildlife Exclusion Fencing Plan will be submitted for Segments 1 and 3, prior to initiation of construction activities in those segments.
BIO-1d: Implement western pond turtle avoidance measures.	**X**	**X**			Ongoing	Pre-construction surveys are occurring no more than 7 days prior to the initiation of construction activities nearby/adjacent to potential habitat for WPT. No WPT or WPT sign have been observed to date on the Project.
BIO-1e: Implement Townsend's big-eared bat, pallid bat, hoary bat, and fringed myotis avoidance measures.	**X**	**X**			Ongoing	Pre-construction surveys are occurring no more than 7 days prior to the initiation of construction activities with the potential to disturb bats or their habitat. No special-status bats or sign have been observed to date on the Project.

Mitigation Monitoring and Reporting

Mitigation Measure	Mitigation Timing				Status	Status Notes
	Pre-Construction	Construction	Post-Construction	Operation		
BIO-1f: Implement western burrowing owl avoidance measures.	**X**	**X**			Ongoing	Protocol surveys for Western Burrowing Owl were conducted from April 2017 through July 2017 at previously identified potentially suitable habitat locations. Note that all of these locations are in Construction Segment 4 (southern Santa Clara and San Jose). No Burrowing Owls were observed during the surveys. Construction in Segment 4 is anticipated to occur in 2018. Prior to construction activities in Segment 4, pre-construction surveys of the potential habitat areas will occur no more than 7 days prior to the onset of construction activities. In addition, protocol surveys were initiated in March 2018, and were completed in June 2018, at the previously identified potentially suitable habitat locations, which will allow work to occur during the 2019 breeding season, if necessary. No Burrowing Owls were observed during the 2018 surveys.
BIO-1g: Implement northern harrier, white-tailed kite, American peregrine falcon, saltmarsh common yellowthroat, purple martin, and other nesting bird avoidance measures.	**X**	**X**			Ongoing	Nesting Bird surveys were conducted from February 1 through September 15, 2017 prior to project-related activities with the potential to impact nesting birds. No active nests were observed during this reporting period. Nesting Bird surveys were initiated on February 1, 2018 and continued throughout the reporting period. Active nests were observed during this reporting period, and no-disturbance buffers were implemented to avoid any impacts to active nests, and all project activities which occurred nearby active nests were monitored by agency-approved

Mitigation Monitoring and Reporting

Mitigation Measure	Mitigation Timing				Status	Status Notes
	Pre-Construction	Construction	Post-Construction	Operation		
						biological monitors.
BIO-1h: Conduct biological resource survey of future contractor-determined staging areas.	**X**	**X**			Ongoing	The agency-approved Qualified Biologist has conducted surveys of the staging areas currently being used for construction activities. No special-status species or other potentially sensitive biological resources were observed. The agency-approved Qualified Biologist will continue to survey ahead of the initiation of activities at planned staging areas as the Project moves into new construction areas.
BIO-1i: Minimize impacts on Monarch butterfly overwintering sites.	**X**	**X**			Ongoing	The agency-approved Qualified Biologist has periodically monitored the project limits to evaluate the presence of Monarch butterfly overwintering sites. No Monarch butterfly overwintering sites have been observed on the Project to date.
BIO-1j: Avoid nesting birds and bats during vegetation maintenance.				**X**	Upcoming	To be completed during Project operation.
BIO-2: Implement serpentine bunchgrass avoidance and revegetation measures.	**X**	**X**	**X**		Complete	Not applicable. Subsequent habitat assessment and avoidance of Communication Hill eliminated any potential to affect serpentine bunchgrass. This measure is no longer needed.

Mitigation Monitoring and Reporting

Mitigation Measure	Mitigation Timing				Status	Status Notes
	Pre-Construction	Construction	Post-Construction	Operation		
BIO-3: Avoid or compensate for impacts on wetlands and waters.	**X**	**X**	**X**		Complete	The JPB has compensated for unavoidable wetland impacts by purchasing adequate credits from a wetlands mitigation bank approved by USACE and SFRWQCB.
BIO-5: Implement Tree Avoidance, Minimization, and Replacement Plan.	**X**	**X**	**X**		Ongoing	Tree removal and pruning activities were initiated in August 2017 under the guidance of the BBI Arborist, and in accordance with the Tree Avoidance, Minimization, and Replacement Plan. Tree Removal and Pruning status is provided to the JPB on a weekly basis.
BIO-6: Pay *Santa Clara Valley Habitat Plan* land cover fee (if necessary).	**X**				Complete	Not applicable. The SCVHP does not apply to the Project because TPS2, Option 1 was not selected and OCS does not extend to Communication Hill. This measure is not needed.
CUL-1a: Evaluate and minimize impacts on structural integrity of historic tunnels.	**X**				Upcoming	To be implemented prior to construction in tunnels.
CUL-1b: Minimize impacts on historic decorative tunnel material.	**X**				UpcomingCompleted	To be implemented prior to construction in tunnels. Historic American Engineering Record (HAER) documentation was completed in October 2018, pursuant to this measure.

Mitigation Monitoring and Reporting

Mitigation Measure	Mitigation Timing				Status	Status Notes
	Pre-Construction	Construction	Post-Construction	Operation		
CUL-1c: Install project facilities in a way that minimizes impacts on historic tunnel interiors.	**X**				Upcoming	To be implemented prior to construction in tunnels.
CUL-1d: Implement design commitments at historic railroad stations	**X**				Complete	The Qualified Architectural Historian completed and submitted the HABS Level III documents to the JPB for all seven of the historic stations. Pole placement has been designed to minimize the visual impact to historic stations and all design changes are reviewed by the Environmental Compliance Lead to ensure the mitigation measure is being implemented as the design of the project progresses.
CUL-1e: Implement specific tree mitigation considerations at two potentially historic properties and landscape recordation, as necessary.	**X**	**X**			Complete	It was determined that the project is not acquiring any ROW at either of the subject properties so all tree effects would be within the JPB ROW. Therefore, the APE does not include these two historic properties. This measure is no longer needed.

Mitigation Monitoring and Reporting

Mitigation Measure	Mitigation Timing				Status	Status Notes
	Pre-Construction	Construction	Post-Construction	Operation		
CUL-1f: Implement historic bridge and underpass design requirements.	X				Ongoing	This measure is being implemented as described during the design process and will be incorporated into the final design. The four bridges that are included in the MMRP are rail bridges crossing over another feature. Design of the OCS system is taking into account that there are requirements that restrict the design. Thus far, the designs for Construction Segments 2 & 4 are in process and designs are not yet complete. The D-B will forward to the Architectural Historian once complete.
CUL-2a: Conduct an archaeological resource survey and/or monitoring of the removal of pavement or other obstructions to determine if historical resources under CEQA or unique archaeological resources under PRC 21083.2 are present.	X				Ongoing	Periodic inspections of ground surface areas along the alignment, in conjunction with cultural monitoring as-needed of project activities in culturally sensitive areas are ongoing. The Archaeological Final Report will be provided at the conclusion of construction activities.
CUL-2b: Conduct exploratory trenching or coring of areas where subsurface project disturbance is planned in those areas with "high" or "very high" potential for buried site.	X				Ongoing	Exploratory trenching and subsurface testing of all potentially culturally sensitive areas occurred prior to the initiation of construction activities in those areas. The results will be included in the Archaeological Final Report. No cultural resources requiring the development of a treatment plan were observed. A Native American monitor has been present for all exploratory trenching and subsurface testing work.

Mitigation Monitoring and Reporting

Mitigation Measure	Mitigation Timing				Status	Status Notes
	Pre-Construction	Construction	Post-Construction	Operation		
CUL-2c: Conduct limited subsurface testing before performing ground-disturbing work within 50 meters of a known archaeological site.	**X**				Ongoing	Exploratory trenching and subsurface testing of all potentially culturally sensitive areas occurred prior to the initiation of construction activities in those areas. The results will be included in the Archaeological Final Report. No cultural resources requiring the development of a treatment plan were observed. A Native American monitor has been present for all exploratory trenching and subsurface testing work.
CUL-2d: Conduct exploratory trenching or coring of areas within the three zones of special sensitivity where subsurface project disturbance is planned.	**X**				Ongoing	Exploratory trenching and subsurface testing of all potentially culturally sensitive areas occurred prior to the initiation of construction activities in those areas. The results will be included in the Archaeological Final Report. No cultural resources requiring the development of a treatment plan were observed. A Native American monitor has been present for all exploratory trenching and subsurface testing work.
CUL-2e: Stop work if cultural resources are encountered during ground-disturbing activities.	**X**	**X**			Ongoing	No prehistoric or historic-period cultural materials have been observed during cultural monitoring.
CUL-2f: Conduct archaeological monitoring of ground-disturbing activities in areas as determined by JPB and SHPO.		**X**			Ongoing	Cultural monitoring as-needed of project activities in culturally sensitive areas is ongoing. The Archaeological Final Report will be provided at the conclusion of construction activities.

Mitigation Monitoring and Reporting

Mitigation Measure	Mitigation Timing				Status	Status Notes
	Pre-Construction	Construction	Post-Construction	Operation		
CUL-3: Comply with state and county procedures for the treatment of human remains discoveries.		X			Ongoing	No human remains have been observed to date on the Project.
EMF-2: Minimize EMI effects during final design, Monitor EMI effects during testing, commission and operations, and Remediate Substantial Disruption of Sensitive Electrical Equipment.	X	X	X		Ongoing	The design requirements indicated in the measure are being implemented through the final design as described. Designs are submitted and reviewed/commented on by JPB. Monitoring EMI effects will occur post construction.
GEO-1: Perform a site-specific geotechnical study for traction power facilities.	X				Ongoing	The design requirements indicated in the measure are being implemented through the final design as described. Geotechnical studies and results are submitted to JPB as completed.
GEO-4a: Identification of expansive soils.	X				Ongoing	The design requirements indicated in the measure are being implemented through the final design as described. Geotechnical studies and results are submitted to JPB as completed.

Mitigation Monitoring and Reporting

Mitigation Measure	Mitigation Timing				Status	Status Notes
	Pre-Construction	Construction	Post-Construction	Operation		
GEO-4b: Mitigation of expansive soils.	**X**				Ongoing	The design requirements indicated in the measure are being implemented through the final design as described. Geotechnical studies and results are submitted to JPB as completed.
HAZ-2a: Conduct a Phase II Environmental Site Assessment prior to construction.	**X**				Complete	A Phase II Environmental Assessment was completed prior to construction by the JPB consultant, and the results were provided to BBI, and the required mitigation is being implemented prior to the initiation of construction activities.
HAZ-2b: Implement engineering controls and best management practices during construction.	**X**	**X**			Ongoing	Field activities are being monitored daily for significant color changes or odors which may indicate contamination.
HYD-1: Implement construction dewatering treatment, if necessary.	**X**	**X**			Ongoing	Facilities & BMPs are in place to deal with this requirement should it arise in the OCS foundations.
HYD-4: Minimize floodplain impacts by minimizing new impervious areas for TPFs or relocating these facilities.	**X**				Ongoing	The design requirements indicated in the measure are being implemented through the final design as described. The TPFs in Construction Segments 2 & 4 are currently in final design and design for TPFs in Construction Segments 1 & 3 has begun. The design minimizes hardscape only to required structure foundations; yard areas are to receive a pervious material.

Mitigation Monitoring and Reporting

Mitigation Measure	Mitigation Timing				Status	Status Notes
	Pre-Construction	Construction	Post-Construction	Operation		
HYD-5: Provide for electrical safety at TPFs subject to periodic or potential flooding.	**X**			**X**	Ongoing	The design requirements indicated in the measure are being implemented through the final design as described. The TPFs in Construction Segments 2 & 4 are currently in final design and design for TPFs in Construction Segments 1 & 3 has begun. The design plan currently raises the TPFs above the floodplain.
HYD-7: Implement sea level rise vulnerability assessment and adaptation plan.				**X**	Ongoing	The JPB has initiated this measure and preparation of the sea level rise vulnerability assessment and adaptation plan is underway.
NOI-1a: Implement Construction Noise Control Plan.	**X**	**X**			Ongoing	The Noise and Vibration Control Plan has been submitted and is being implemented. Field activity is monitored per the Plan. If allowable noise levels are near or exceed allowable noise levels, mitigation such as blankets are used from that point forward.
NOI-1b: Conduct site-specific acoustical analysis of ancillary facilities based on the final mechanical equipment and site design and implement noise control treatments where required.	**X**				Ongoing	The design requirements indicated in the measure are being implemented through the final design as described. Design is still in process and a noise study is currently being performed.
NOI-2a: Implement Construction Vibration Control Plan.	**X**	**X**			Ongoing	The Noise and Vibration Control Plan has been submitted and is being implemented. Field activity is monitored per the Plan.

Mitigation Monitoring and Reporting

Mitigation Measure	Mitigation Timing				Status	Status Notes
	Pre-Construction	Construction	Post-Construction	Operation		
PSU-8a: Provide continuous coordination with all utility providers.	**X**	**X**			Ongoing	The design requirements indicated in the measure will be implemented through the final design as described. Coordination with utility providers is ongoing and there have not been any service interruptions thus far.
PSU-8b: Adjust OCS pole foundation locations.	**X**				Ongoing	The design requirements indicated in the measure are being implemented through the final design as described.
PSU-8c: Schedule and notify users about potential service interruptions.	**X**	**X**			Ongoing	The design requirements indicated in the measure are being implemented through the final design as described. There have not been any service interruptions thus far.
PSU-9: Require application of relevant construction mitigation measures to utility relocation and transmission line construction by others.	**X**	**X**			Ongoing	JPB has initiated coordination with PG&E regarding transmission line construction. PG&E is currently raising overcrossing lines in Segment 2.
TRA-1a: Implement Construction Road Traffic Control Plan.	**X**	**X**			Ongoing	The D-B has begun traffic control design and permit applications with cities in Segments 2 and 4. Designs have been completed and approved for all cross-over bridges in Segments 2 and 4.
TRA-1c: Implement signal optimization and roadway geometry improvements at impacted intersections for	**X**	**X**			Upcoming	This measure has not started

Mitigation Monitoring and Reporting

Mitigation Measure	Mitigation Timing				Status	Status Notes
	Pre-Construction	Construction	Post-Construction	Operation		
the 2020 Project Condition.						
TRA-2a: Implement construction railway disruption control plan.	**X**	**X**			Ongoing	Minimization of railway disruption is being coordinated by the Site Specific Work Plan. A Construction Railway Disruption Control Plan was prepared to document the measures that are being implemented.
TRA-3b: In cooperation with the City and County of San Francisco, implement surface pedestrian facility improvements to address the Proposed Project's additional pedestrian movements at and immediately adjacent to the San Francisco 4th and King Station.	**X**	**X**	**X**		Upcoming	This measure has not started.
TRA-4b: Continue to improve bicycle facilities at Caltrain stations and partner with bike share programs where available following guidance in Caltrain's Bicycle Access and Parking Plan.				**X**	Ongoing	The JPB adopted the Caltrain Bicycle Parking Management Plan in November 2017, and staff have been working to implement the Plan's recommendations to improve wayside bike parking facilities along the corridor. Staff have also been coordinating with local jurisdictions that have launched bikeshare pilot programs to safely site bicycles near Caltrain stations.

Mitigation Monitoring and Reporting

Mitigation Measure	Mitigation Timing				Status	Status Notes
	Pre-Construction	Construction	Post-Construction	Operation		
NOI-CUMUL-1: Implement a phased program to reduce cumulative train noise along the Caltrain corridor as necessary to address future cumulative noise increases over FTA thresholds				**X**	Upcoming	This measure will be implemented during project operation.
NOI-CUMUL-2: Conduct project-level vibration analysis for Blended System operations and implement vibration reduction measures as necessary and appropriate for the Caltrain corridor				**X**	In Progress	CHSRA is conducting this analysis as part of the EIR/EIS for the San Francisco to San Jose section.
TRA-CUMUL-1: Implement a phased program to provide traffic improvements to reduce traffic delays near at-grade crossings and Caltrain stations				**X**	Upcoming	This measure will be implemented during project operation.
TRA-CUMUL-2: Implement technical solution to allow electric trolley bus transit across 16th Street without OCS conflicts in cooperation with SFMTA.	**X**				Complete	Not applicable. SFMTA has elected to not electrify the 16th Street crossing. This measure no longer applies.
Mitigation Measure TRA-CUMUL-3: As warranted, Caltrain and freight operators will partner to provide Plate H clearance as feasible between San Jose and Bayshore.				**X**	Upcoming	This measure will be implemented during project operation.

Mitigation Monitoring and Reporting

Mitigation Measure	Mitigation Timing				Status	Status Notes
	Pre-Construction	Construction	Post-Construction	Operation		
AES-2a: Minimize OCS construction activity on residential and park areas outside the Caltrain ROW.	**X**	**X**			Ongoing	The OCS proposed construction schedule has been provided to the JPB. OCS construction began the week of October 2, 2017. The D-B has used the potholing process to assist in locating conflicts in the 35% design and attempting to relocate OCS pole locations within the ROW, thereby avoiding parks and residential areas.
AES-2b: Aesthetic treatments for OCS poles, TPFs in sensitive visual locations, and Overbridge Protection Barriers.	**X**				Ongoing	The design requirements indicated in the measure have been implemented as described, and coordination with the specific jurisdictions regarding pole colors and design, TPFs, and Overbridge Protection Barriers, is ongoing.
AES-4a: Minimize spillover light during nighttime construction.		**X**			Ongoing	OCS construction began the week of October 2, 2017. The BBI community relations lead has notified nearby residents of upcoming construction. During construction, lighting is faced inward, towards the railroad tracks, and any complaints will be documented and addressed by the BBI community relations lead.
AES-4b: Minimize light spillover at TPFs.	**X**				Upcoming	The design requirements indicated in the measure are being used in the design process of the TPFs.
AQ-2a: Implement BAAQMD basic and additional construction mitigation measures to reduce construction-related dust.	**X**	**X**			Ongoing	The Dust Mitigation Plan was submitted to the JPB. The requirements in the Dust Mitigation Plan will be implemented throughout the construction period and documented in daily reports.

Mitigation Monitoring and Reporting

Mitigation Measure	Mitigation Timing				Status	Status Notes
	Pre-Construction	Construction	Post-Construction	Operation		
AQ-2b: Implement BAAQMD basic and additional construction mitigation measures to control construction-related ROG and NOX emissions.	**X**	**X**			Ongoing	The Equipment Emissions Control Plan was submitted to the JPB. The requirements in the Equipment Emissions Control Plan will be implemented throughout the construction period and documented in daily reports.
AQ-2c: Utilize clean diesel-powered equipment during construction to control construction-related ROG and NOX emissions.	**X**	**X**			Ongoing	The Equipment Emissions Control Plan was submitted to the JPB. The requirements in the Equipment Emissions Control Plan will be implemented throughout the construction period and documented in daily reports.
BIO-1a: Implement general biological impact avoidance measures.	**X**	**X**			Ongoing	Worker Environmental Awareness Training is provided to all project-related personnel before they work on the project. All measures as described will be implemented throughout the construction period and documented in daily reports.
BIO-1b: Implement special-status plant species avoidance and revegetation measures.	**X**	**X**	**X**		Complete	Not applicable. Subsequent habitat assessment and avoidance of Communication Hill eliminated any potential to affect special-status plant species. The measure is not needed.

Mitigation Monitoring and Reporting

Mitigation Measure	Mitigation Timing				Status	Status Notes
	Pre-Construction	Construction	Post-Construction	Operation		
BIO-1c: Implement California red-legged frog and San Francisco garter snake avoidance measures.	**X**	**X**			Ongoing	Pre-construction surveys are occurring no more than 7 days prior to the initiation of construction activities nearby/adjacent to potential habitat for CRLF and SFGS. The Wildlife Exclusion Fencing Plan for Segments 2 and 4 was submitted and approved by the wildlife agencies, and installation and monitoring of wildlife exclusion fencing is ongoing. No CRLF / SFGS or sign of each species has been observed to date on the Project. A separate Wildlife Exclusion Fencing Plan will be submitted for Segments 1 and 3, prior to initiation of construction activities in those segments.
BIO-1d: Implement western pond turtle avoidance measures.	**X**	**X**			Ongoing	Pre-construction surveys are occurring no more than 7 days prior to the initiation of construction activities nearby/adjacent to potential habitat for WPT. No WPT or WPT sign have been observed to date on the Project.
BIO-1e: Implement Townsend's big-eared bat, pallid bat, hoary bat, and fringed myotis avoidance measures.	**X**	**X**			Ongoing	Pre-construction surveys are occurring no more than 7 days prior to the initiation of construction activities with the potential to disturb bats or their habitat. No special-status bats or sign have been observed to date on the Project.

Mitigation Monitoring and Reporting

Mitigation Measure	Mitigation Timing				Status	Status Notes
	Pre-Construction	Construction	Post-Construction	Operation		
BIO-1f: Implement western burrowing owl avoidance measures.	X	X			Ongoing	Protocol surveys for Western Burrowing Owl were conducted from April 2017 through July 2017 at previously identified potentially suitable habitat locations. Note that all of these locations are in Construction Segment 4 (southern Santa Clara and San Jose). No Burrowing Owls were observed during the surveys. Construction in Segment 4 is anticipated to occur in 2018. Prior to construction activities in Segment 4, pre-construction surveys of the potential habitat areas will occur no more than 7 days prior to the onset of construction activities. In addition, protocol surveys were initiated in March 2018, and were completed in June 2018, at the previously identified potentially suitable habitat locations, which will allow work to occur during the 2019 breeding season, if necessary. No Burrowing Owls were observed during the 2018 surveys.
BIO-1g: Implement northern harrier, white-tailed kite, American peregrine falcon, saltmarsh common yellowthroat, purple martin, and other nesting bird avoidance measures.	X	X			Ongoing	Nesting Bird surveys were conducted from February 1 through September 15, 2017 prior to project-related activities with the potential to impact nesting birds. No active nests were observed during this reporting period. Nesting Bird surveys were initiated on February 1, 2018 and continued throughout the reporting period. Active nests were observed during this reporting period, and no-disturbance buffers were implemented to avoid any impacts to active nests, and all project activities which occurred nearby active nests were monitored by agency-approved

Mitigation Monitoring and Reporting

Mitigation Measure	Mitigation Timing				Status	Status Notes
	Pre-Construction	Construction	Post-Construction	Operation		
						biological monitors.
BIO-1h: Conduct biological resource survey of future contractor-determined staging areas.	**X**	**X**			Ongoing	The agency-approved Qualified Biologist has conducted surveys of the staging areas currently being used for construction activities. No special-status species or other potentially sensitive biological resources were observed. The agency-approved Qualified Biologist will continue to survey ahead of the initiation of activities at planned staging areas as the Project moves into new construction areas.
BIO-1i: Minimize impacts on Monarch butterfly overwintering sites.	**X**	**X**			Ongoing	The agency-approved Qualified Biologist has periodically monitored the project limits to evaluate the presence of Monarch butterfly overwintering sites. No Monarch butterfly overwintering sites have been observed on the Project to date.
BIO-1j: Avoid nesting birds and bats during vegetation maintenance.				**X**	Upcoming	To be completed during Project operation.
BIO-2: Implement serpentine bunchgrass avoidance and revegetation measures.	**X**	**X**	**X**		Complete	Not applicable. Subsequent habitat assessment and avoidance of Communication Hill eliminated any potential to affect serpentine bunchgrass. This measure is no longer needed.

Mitigation Monitoring and Reporting

Mitigation Measure	Mitigation Timing				Status	Status Notes
	Pre-Construction	Construction	Post-Construction	Operation		
BIO-3: Avoid or compensate for impacts on wetlands and waters.	**X**	**X**	**X**		Complete	The JPB has compensated for unavoidable wetland impacts by purchasing adequate credits from a wetlands mitigation bank approved by USACE and SFRWQCB.
BIO-5: Implement Tree Avoidance, Minimization, and Replacement Plan.	**X**	**X**	**X**		Ongoing	Tree removal and pruning activities were initiated in August 2017 under the guidance of the BBI Arborist, and in accordance with the Tree Avoidance, Minimization, and Replacement Plan. Tree Removal and Pruning status is provided to the JPB on a weekly basis.
BIO-6: Pay *Santa Clara Valley Habitat Plan* land cover fee (if necessary).	**X**				Complete	Not applicable. The SCVHP does not apply to the Project because TPS2, Option 1 was not selected and OCS does not extend to Communication Hill. This measure is not needed.
CUL-1a: Evaluate and minimize impacts on structural integrity of historic tunnels.	**X**				Upcoming	To be implemented prior to construction in tunnels.
CUL-1b: Minimize impacts on historic decorative tunnel material.	**X**				Upcoming	To be implemented prior to construction in tunnels.

Mitigation Monitoring and Reporting

Mitigation Measure	Mitigation Timing				Status	Status Notes
	Pre-Construction	Construction	Post-Construction	Operation		
CUL-1c: Install project facilities in a way that minimizes impacts on historic tunnel interiors.	**X**				Upcoming	To be implemented prior to construction in tunnels.
CUL-1d: Implement design commitments at historic railroad stations	**X**				Complete	The Qualified Architectural Historian completed and submitted the HABS Level III documents to the JPB for all seven of the historic stations. Pole placement has been designed to minimize the visual impact to historic stations and all design changes are reviewed by the Environmental Compliance Lead to ensure the mitigation measure is being implemented as the design of the project progresses.
CUL-1e: Implement specific tree mitigation considerations at two potentially historic properties and landscape recordation, as necessary.	**X**	**X**			Complete	It was determined that the project is not acquiring any ROW at either of the subject properties so all tree effects would be within the JPB ROW. Therefore, the APE does not include these two historic properties. This measure is no longer needed.

Mitigation Monitoring and Reporting

Mitigation Measure	Mitigation Timing				Status	Status Notes
	Pre-Construction	Construction	Post-Construction	Operation		
CUL-1f: Implement historic bridge and underpass design requirements.	X				Ongoing	This measure is being implemented as described during the design process and will be incorporated into the final design. The four bridges that are included in the MMRP are rail bridges crossing over another feature. Design of the OCS system is taking into account that there are requirements that restrict the design. Thus far, the designs for Construction Segments 2 & 4 are in process and designs are not yet complete. The D-B will forward to the Architectural Historian once complete.
CUL-2a: Conduct an archaeological resource survey and/or monitoring of the removal of pavement or other obstructions to determine if historical resources under CEQA or unique archaeological resources under PRC 21083.2 are present.	X				Ongoing	Periodic inspections of ground surface areas along the alignment, in conjunction with cultural monitoring as-needed of project activities in culturally sensitive areas are ongoing. The Archaeological Final Report will be provided at the conclusion of construction activities.
CUL-2b: Conduct exploratory trenching or coring of areas where subsurface project disturbance is planned in those areas with "high" or "very high" potential for buried site.	X				Ongoing	Exploratory trenching and subsurface testing of all potentially culturally sensitive areas occurred prior to the initiation of construction activities in those areas. The results will be included in the Archaeological Final Report. No cultural resources requiring the development of a treatment plan were observed. A Native American monitor has been present for all exploratory trenching and subsurface testing work.

Mitigation Monitoring and Reporting

Mitigation Measure	Mitigation Timing				Status	Status Notes
	Pre-Construction	Construction	Post-Construction	Operation		
CUL-2c: Conduct limited subsurface testing before performing ground-disturbing work within 50 meters of a known archaeological site.	**X**				Ongoing	Exploratory trenching and subsurface testing of all potentially culturally sensitive areas occurred prior to the initiation of construction activities in those areas. The results will be included in the Archaeological Final Report. No cultural resources requiring the development of a treatment plan were observed. A Native American monitor has been present for all exploratory trenching and subsurface testing work.
CUL-2d: Conduct exploratory trenching or coring of areas within the three zones of special sensitivity where subsurface project disturbance is planned.	**X**				Ongoing	Exploratory trenching and subsurface testing of all potentially culturally sensitive areas occurred prior to the initiation of construction activities in those areas. The results will be included in the Archaeological Final Report. No cultural resources requiring the development of a treatment plan were observed. A Native American monitor has been present for all exploratory trenching and subsurface testing work.
CUL-2e: Stop work if cultural resources are encountered during ground-disturbing activities.	**X**	**X**			Ongoing	No prehistoric or historic-period cultural materials have been observed during cultural monitoring.
CUL-2f: Conduct archaeological monitoring of ground-disturbing activities in areas as determined by JPB and SHPO.		**X**			Ongoing	Cultural monitoring as-needed of project activities in culturally sensitive areas is ongoing. The Archaeological Final Report will be provided at the conclusion of construction activities.

Mitigation Monitoring and Reporting

Mitigation Measure	Mitigation Timing				Status	Status Notes
	Pre-Construction	Construction	Post-Construction	Operation		
CUL-3: Comply with state and county procedures for the treatment of human remains discoveries.		X			Ongoing	No human remains have been observed to date on the Project.
EMF-2: Minimize EMI effects during final design, Monitor EMI effects during testing, commission and operations, and Remediate Substantial Disruption of Sensitive Electrical Equipment.	X	X	X		Ongoing	The design requirements indicated in the measure are being implemented through the final design as described. Designs are submitted and reviewed/commented on by JPB. Monitoring EMI effects will occur post construction.
GEO-1: Perform a site-specific geotechnical study for traction power facilities.	X				Ongoing	The design requirements indicated in the measure are being implemented through the final design as described. Geotechnical studies and results are submitted to JPB as completed.
GEO-4a: Identification of expansive soils.	X				Ongoing	The design requirements indicated in the measure are being implemented through the final design as described. Geotechnical studies and results are submitted to JPB as completed.

Mitigation Monitoring and Reporting

Mitigation Measure	Mitigation Timing				Status	Status Notes
	Pre-Construction	Construction	Post-Construction	Operation		
GEO-4b: Mitigation of expansive soils.	**X**				Ongoing	The design requirements indicated in the measure are being implemented through the final design as described. Geotechnical studies and results are submitted to JPB as completed.
HAZ-2a: Conduct a Phase II Environmental Site Assessment prior to construction.	**X**				Complete	A Phase II Environmental Assessment was completed prior to construction by the JPB consultant, and the results were provided to BBI, and the required mitigation is being implemented prior to the initiation of construction activities.
HAZ-2b: Implement engineering controls and best management practices during construction.	**X**	**X**			Ongoing	Field activities are being monitored daily for significant color changes or odors which may indicate contamination.
HYD-1: Implement construction dewatering treatment, if necessary.	**X**	**X**			Ongoing	Facilities & BMPs are in place to deal with this requirement should it arise in the OCS foundations.
HYD-4: Minimize floodplain impacts by minimizing new impervious areas for TPFs or relocating these facilities.	**X**				Ongoing	The design requirements indicated in the measure are being implemented through the final design as described. The TPFs in Construction Segments 2 & 4 are currently in final design and design for TPFs in Construction Segments 1 & 3 has begun. The design minimizes hardscape only to required structure foundations; yard areas are to receive a pervious material.

Mitigation Monitoring and Reporting

Mitigation Measure	Mitigation Timing				Status	Status Notes
	Pre-Construction	Construction	Post-Construction	Operation		
HYD-5: Provide for electrical safety at TPFs subject to periodic or potential flooding.	**X**			**X**	Ongoing	The design requirements indicated in the measure are being implemented through the final design as described. The TPFs in Construction Segments 2 & 4 are currently in final design and design for TPFs in Construction Segments 1 & 3 has begun. The design plan currently raises the TPFs above the floodplain.
HYD-7: Implement sea level rise vulnerability assessment and adaptation plan.				**X**	Ongoing	The JPB has initiated this measure and preparation of the sea level rise vulnerability assessment and adaptation plan is underway.
NOI-1a: Implement Construction Noise Control Plan.	**X**	**X**			Ongoing	The Noise and Vibration Control Plan has been submitted and is being implemented. Field activity is monitored per the Plan. If allowable noise levels are near or exceed allowable noise levels, mitigation such as blankets are used from that point forward.
NOI-1b: Conduct site-specific acoustical analysis of ancillary facilities based on the final mechanical equipment and site design and implement noise control treatments where required.	**X**				Ongoing	The design requirements indicated in the measure are being implemented through the final design as described. Design is still in process and a noise study is currently being performed.
NOI-2a: Implement Construction Vibration Control Plan.	**X**	**X**			Ongoing	The Noise and Vibration Control Plan has been submitted and is being implemented. Field activity is monitored per the Plan.

Mitigation Monitoring and Reporting

Mitigation Measure	Mitigation Timing				Status	Status Notes
	Pre-Construction	Construction	Post-Construction	Operation		
PSU-8a: Provide continuous coordination with all utility providers.	**X**	**X**			Ongoing	The design requirements indicated in the measure will be implemented through the final design as described. Coordination with utility providers is ongoing and there have not been any service interruptions thus far.
PSU-8b: Adjust OCS pole foundation locations.	**X**				Ongoing	The design requirements indicated in the measure are being implemented through the final design as described.
PSU-8c: Schedule and notify users about potential service interruptions.	**X**	**X**			Ongoing	The design requirements indicated in the measure are being implemented through the final design as described. There have not been any service interruptions thus far.
PSU-9: Require application of relevant construction mitigation measures to utility relocation and transmission line construction by others.	**X**	**X**			Ongoing	JPB has initiated coordination with PG&E regarding transmission line construction. PG&E is currently raising overcrossing lines in Segment 2.
TRA-1a: Implement Construction Road Traffic Control Plan.	**X**	**X**			Ongoing	The D-B has begun traffic control design and permit applications with cities in Segments 2 and 4. Designs have been completed and approved for all cross-over bridges in Segments 2 and 4.
TRA-1c: Implement signal optimization and roadway geometry improvements at impacted intersections for	**X**	**X**			Upcoming	This measure has not started

Mitigation Monitoring and Reporting

Mitigation Measure	Mitigation Timing				Status	Status Notes
	Pre-Construction	Construction	Post-Construction	Operation		
the 2020 Project Condition.						
TRA-2a: Implement construction railway disruption control plan.	**X**	**X**			Ongoing	Minimization of railway disruption is being coordinated by the Site Specific Work Plan. A Construction Railway Disruption Control Plan was prepared to document the measures that are being implemented.
TRA-3b: In cooperation with the City and County of San Francisco, implement surface pedestrian facility improvements to address the Proposed Project's additional pedestrian movements at and immediately adjacent to the San Francisco 4th and King Station.	**X**	**X**	**X**		Upcoming	This measure has not started.
TRA-4b: Continue to improve bicycle facilities at Caltrain stations and partner with bike share programs where available following guidance in Caltrain's Bicycle Access and Parking Plan.				**X**	Ongoing	The JPB adopted the Caltrain Bicycle Parking Management Plan in November 2017, and staff have been working to implement the Plan's recommendations to improve wayside bike parking facilities along the corridor. Staff have also been coordinating with local jurisdictions that have launched bikeshare pilot programs to safely site bicycles near Caltrain stations.

Mitigation Monitoring and Reporting

Mitigation Measure	Mitigation Timing				Status	Status Notes
	Pre-Construction	Construction	Post-Construction	Operation		
NOI-CUMUL-1: Implement a phased program to reduce cumulative train noise along the Caltrain corridor as necessary to address future cumulative noise increases over FTA thresholds				**X**	Upcoming	This measure will be implemented during project operation.
NOI-CUMUL-2: Conduct project-level vibration analysis for Blended System operations and implement vibration reduction measures as necessary and appropriate for the Caltrain corridor				**X**	In Progress	CHSRA is conducting this analysis as part of the EIR/EIS for the San Francisco to San Jose section.
TRA-CUMUL-1: Implement a phased program to provide traffic improvements to reduce traffic delays near at-grade crossings and Caltrain stations				**X**	Upcoming	This measure will be implemented during project operation.
TRA-CUMUL-2: Implement technical solution to allow electric trolley bus transit across 16th Street without OCS conflicts in cooperation with SFMTA.	**X**				Complete	Not applicable. SFMTA has elected to not electrify the 16th Street crossing. This measure no longer applies.
Mitigation Measure TRA-CUMUL-3: As warranted, Caltrain and freight operators will partner to provide Plate H clearance as feasible between San Jose and Bayshore.				**X**	Upcoming	This measure will be implemented during project operation.