Modernization Program
Peninsula Corridor Electrification Project (PCEP)

July 2019
Monthly Progress Report

July 31, 2019

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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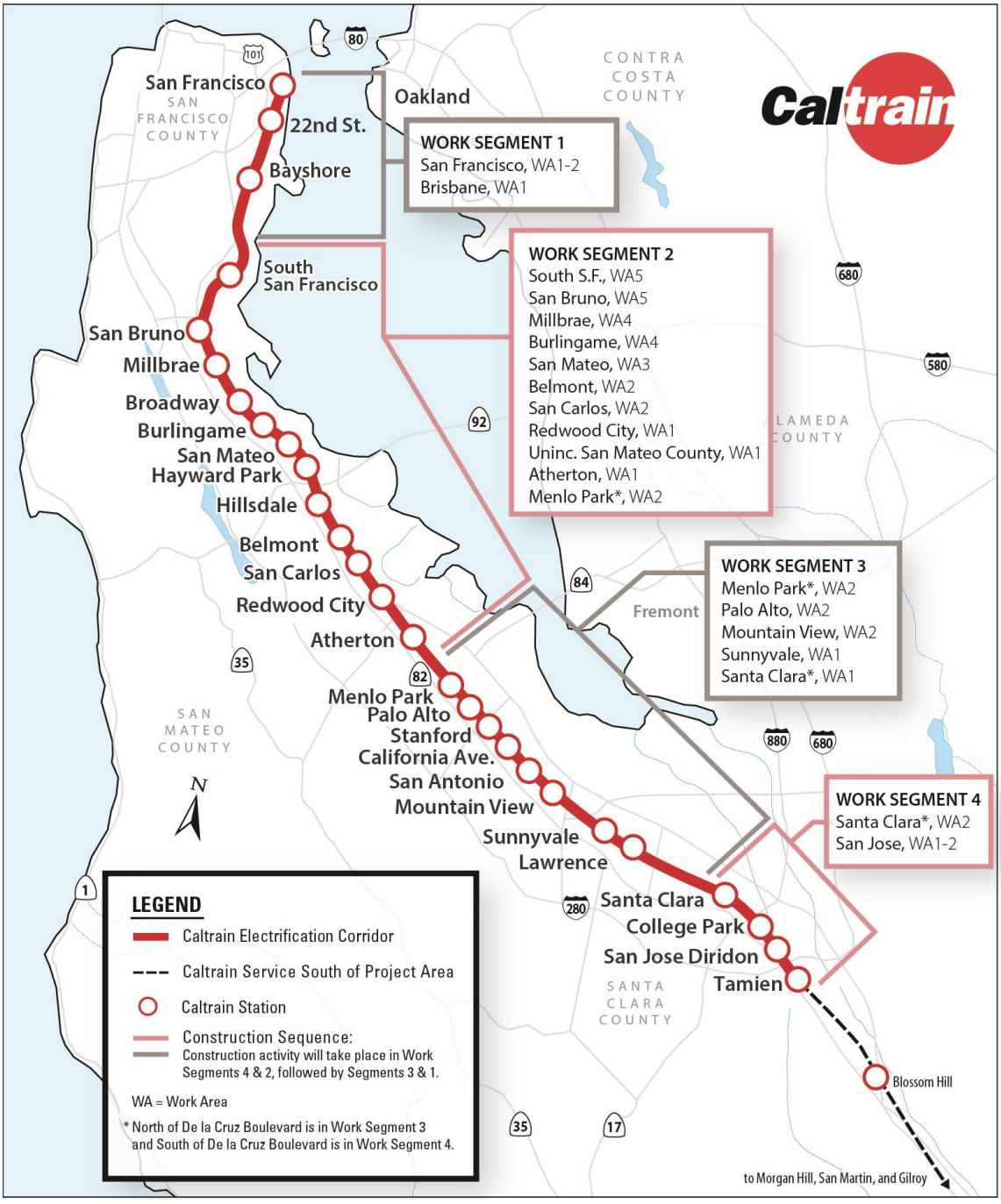
2.0 EXECUTIVE SUMMARY

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



Electrification construction activities this month included installation of Overhead Catenary System (OCS) poles, disconnect switches, gantry enclosures, cables, pipes, wires, ductbank, and conduits. One hundred one foundations were installed in the month of July.

Five additional EMU carshells arrived at the Salt Lake City assembly facility this month. Ongoing EMU activities include Final Design Reviews (FDR), First Article Inspections (FAI), and quality assurance training.

Pre-construction meetings were held for the Centralized Equipment Maintenance and Operations Facility (CEMOF) upgrade project. Work this month includes locating and identifying underground utilities in the work area and mobilizing the contractor to the site.

2.1. Monthly Dashboards

Dashboard progress charts are included below to summarize construction progress.

Figure 2-2 Expenditure – Planned vs. Actual

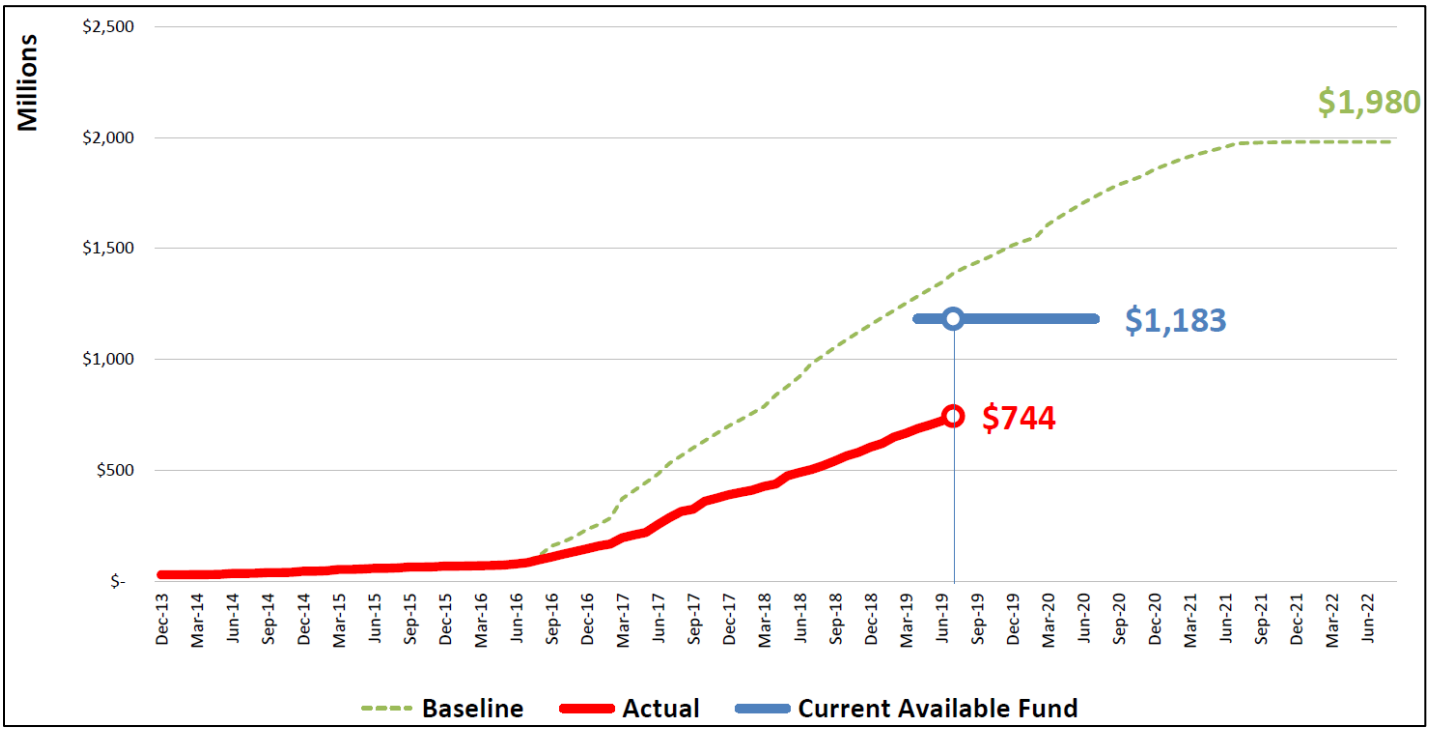


Figure 2-3 Spending Rate vs Required

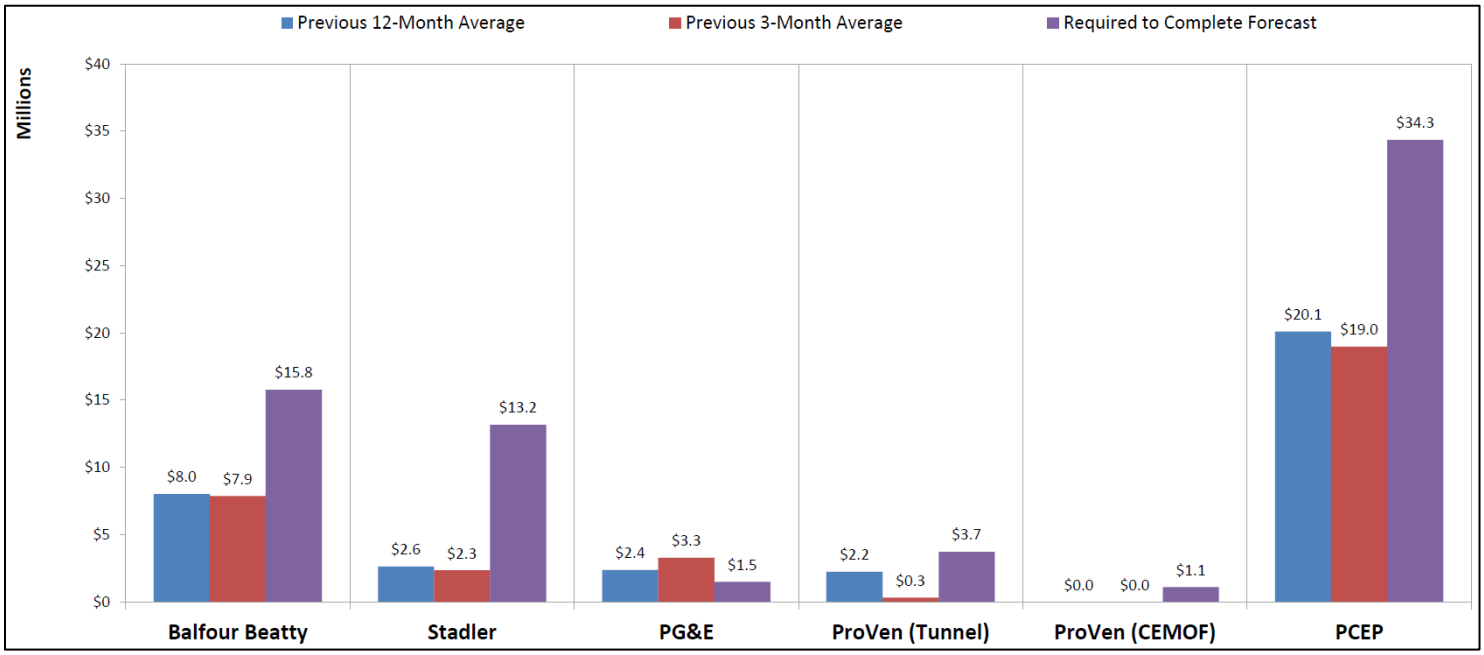
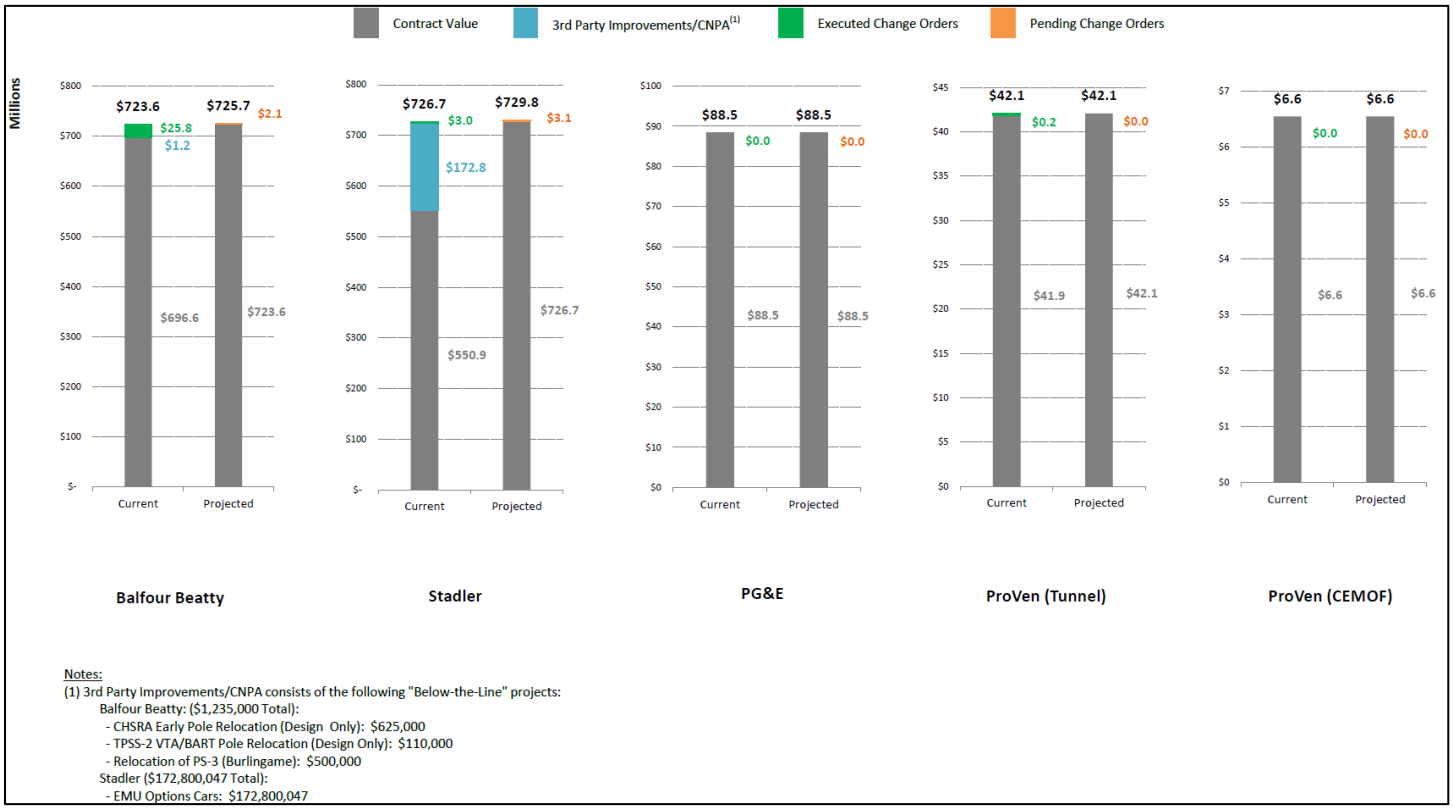


Figure 2-4 Construction Contract Budgets



Notes:
(1) 3rd Party Improvements/CNPA consists of the following "Below-the-Line" projects:
Balfour Beatty: ($1,235,000 Total):
- CHSRA Early Pole Relocation (Design Only): $625,000
- TPSS-2 VTA/BART Pole Relocation (Design Only): $110,000
- Relocation of PS-3 (Burlingame): $500,000
Stadler ($172,800,047 Total):
- EMU Options Cars: $172,800,047

Figure 2-5 OCS Foundation Production

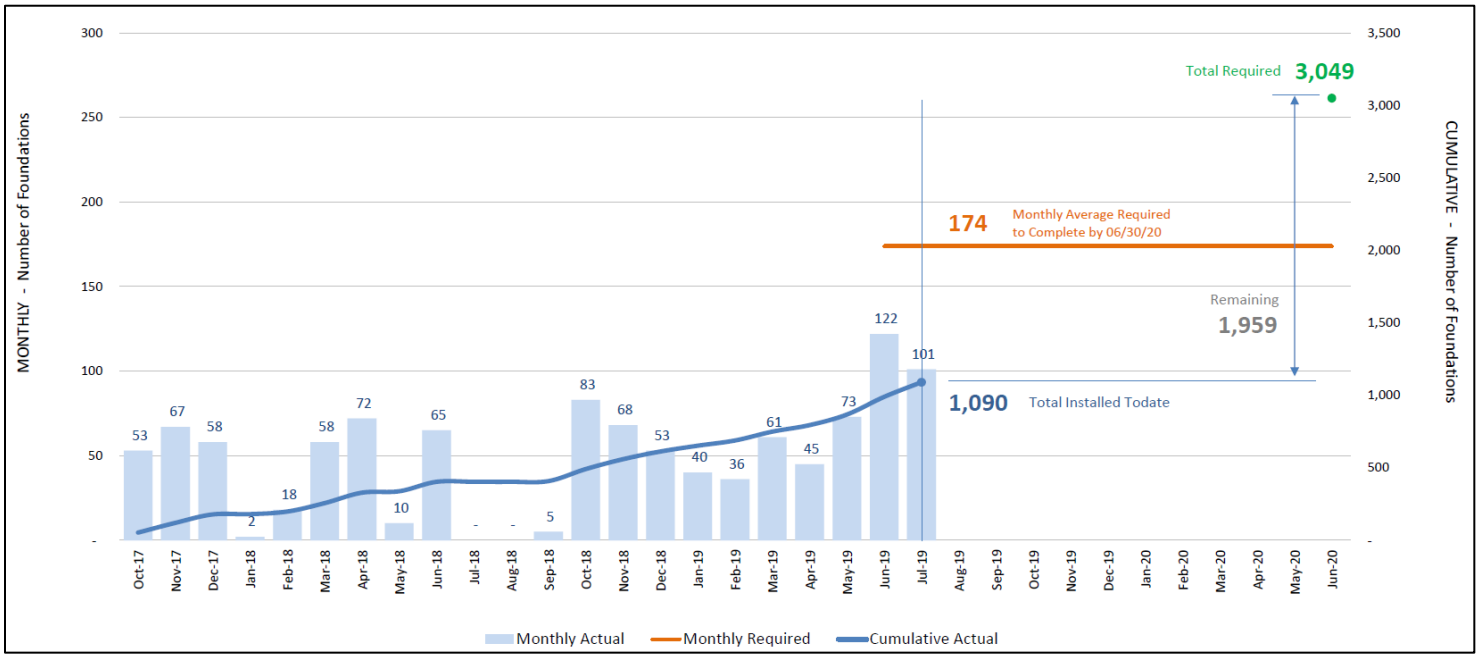
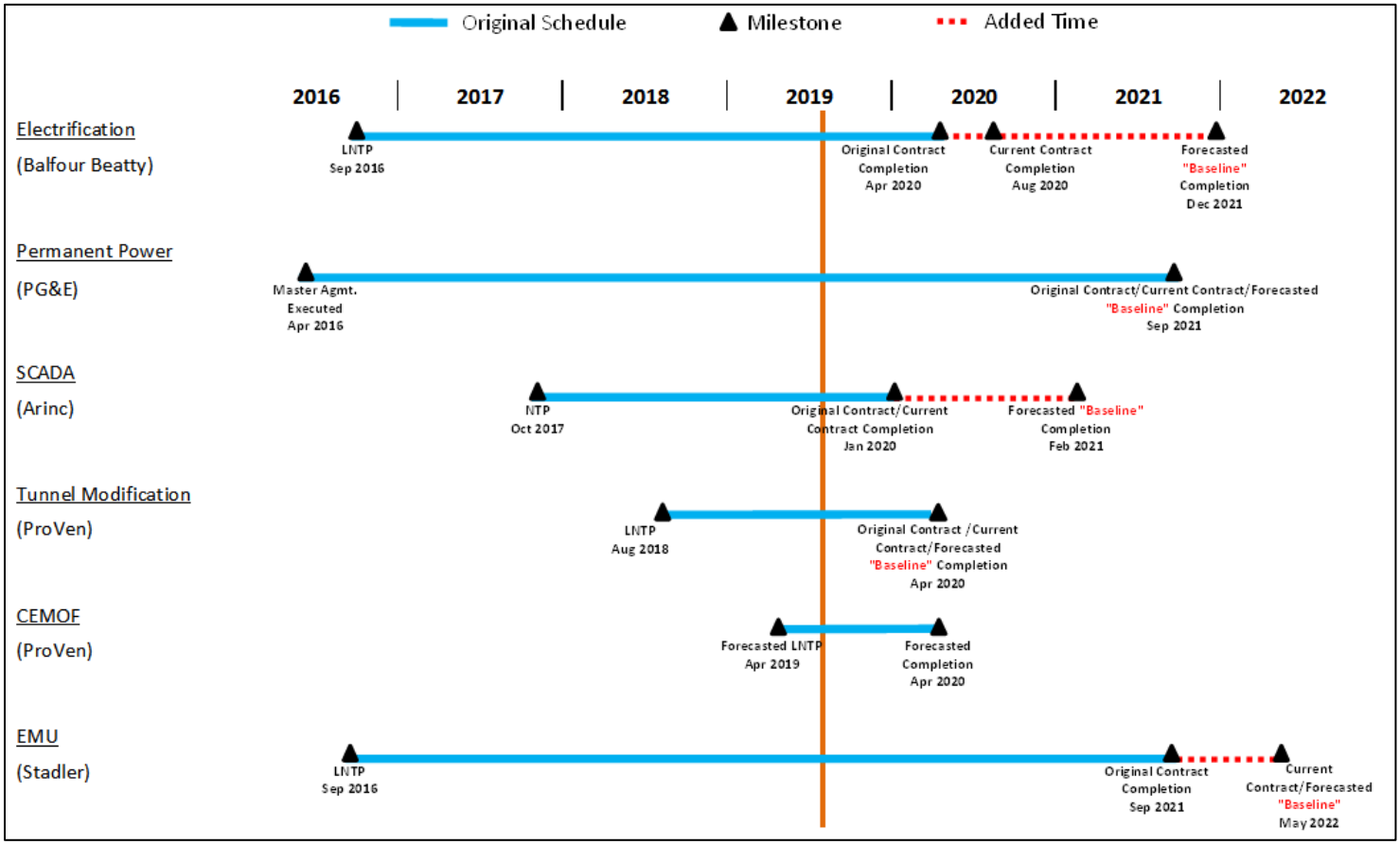


Figure 2-6 Contractor Completion Schedule



2.2. 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, such as:

- Grade crossing designs, including progress of design and preparation for meeting with key stakeholders such as the Federal Railroad Administration (FRA), California Public Utilities Commission (CPUC) and local jurisdictions
- Potholing status and foundation installation sequencing
- Key right of way acquisition issues as related to construction activities
- Review of key actions from weekly Balfour Beatty progress meetings, status of critical submittals or Requests for Information (RFI), open non-conformance reports, and open critical issues from the Design Build (DB) contract
- 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 Project
- The utility relocation status
- Status of the Tunnel Modification construction
- Updates on DB and program schedule, including key foundation and traction power facility milestones, PG&E Infrastructure buildout and power quality study status
- Upcoming changes to the contract in preparation for the Change Management Board (CMB) and specific contract change orders that require technical review and input

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

The PMOC recommended additional changes to the Program Management Plan, including writing a procedure to annually locate and store reference documents that are controlled by groups outside the PCEP. The Paralleling Station (PS) PS-2 and PS-3 Relocation National Environmental Policy Act (NEPA) re-evaluation was received from FTA and there were no significant impacts to the original Finding of No Significant Impacts. Fiscal Year 2020 PCEP funding is in place with the amendment for $100 million in Full Funding Grant Agreement (FFGA) core capacity funds. The Project Management Oversight Contractor (PMOC) will be conducting an audit of compliance of the Safety and Security Management Plan in the coming months. Arrangements are being made to move the electric test locomotives from Oakland to San Jose where they will be stored until BBII will use them to test power draw and proper functioning of the OCS. Installation of static and feeder wire has begun. Numerous construction activities are underway including installation of cantilevers, balance weights, and assemblies in Segment 2, structural steel, circuit breakers, and switches at Traction Power Substation (TPS) TPS-2, transformers and ductbank at PS-6, PS-4, and PS-7. Tunnel scope activities continue, and additional shutdowns will be needed this winter and next spring to complete the tunnel modification project.

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, Wai-On Su

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. A spreadsheet for keeping track of Action Items and the individual(s) assigned to these items is also being used. Meetings are also held bi-weekly with the electrification contractor to discuss design and construction integration issues. The Systems Integration Lead also maintains contact 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. There is coordination with the Tunnel Modification Project as well. Progress on activities including systems integration testing activities, FRA, FTA and safety certification are being tracked. The PCEP Systems Integration Testing Plan has been accepted.

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, Wai Siu

The overall schedule remains unchanged from last month. The forecasted Revenue Service Date (RSD) remains May 2022. The addition of approximately three and a half months of contingency yields an RSD of August 2022. The program critical path runs through the manufacturing and testing of EMU trainsets.

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, SFCTA: Luis Zurinaga, MTC: Trish Stoops

Two risks were added, five retired, three regraded, and five added to the Watch List.

Change Management Board (CMB) – Monthly

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

Activity this Month

The CMB meeting was held on July 24.

Funding Partners: CHSRA: Boris Lipkin and Simon Whitehorn; Metropolitan Transportation Commission (MTC): Trish Stoops and Kenneth Folan; SFCTA: Luis Zurinaga; VTA: Krishna Davey and Edwin Castillo; SMCTA: Joe Hurley

The CMB discusses major topics including 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.

CEMOF Contract

No changes were identified for consideration.

Stadler Contract

One change was approved.

SCADA Contract

No changes were identified for consideration

Tunnel Modification Contract

No changes were identified for consideration.

2.3. Schedule

The overall schedule remains unchanged from last month. The forecasted Revenue Service Date (RSD) remains May 2022. The program critical path runs through the manufacturing and testing of EMU trainsets.

BBII continues to report an overall delay to substantial completion, which is primarily due to the time it has taken to finalize the modifications required for the signal system. JPB is working with BBII on the issue and is urging BBII to accelerate resolution. JPB's forecasted date for BBII's completion has been updated to December 31, 2021 to reflect the signal system work. The anticipated revenue service date is unchanged. Though delays have been reported with the Stadler contract and the arrival of the first trainset at JPB, there is no anticipated effect on the overall vehicle schedule.

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

Table 2-1 Schedule Status

Milestones	Program Plan	Progress Schedule (June 2019)[1]
Segment 4 Completion	11/21/2019	05/22/2020
○ Interconnection from PG&E Substation to Traction Power Substation (TPS)	N/A	04/27/2020
Arrival of First Vehicle in Pueblo, CO	N/A	05/29/2020[2]
Arrival of First Vehicle at JPB	07/29/2019	02/26/2021[2]
PG&E Provides Permanent Power	09/09/2021	09/09/2021
Electrification Substantial Completion	08/10/2020	12/31/2021[2]
Start Phased Revenue Service	N/A	01/03/2022[2]
RSD (w/o Risk Contingency)	12/09/2021	05/06/2022
FFGA RSD (w/ Risk Contingency)	08/22/2022	08/22/2022

Note:

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

2.4. 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	$17,262,240	$584,241,629	$731,883,579	$1,316,125,208
EMU Subtotal	$664,127,325	$664,127,325	$5,355,317	$159,652,699	$504,474,625	$664,127,325
PCEP TOTAL	$1,980,252,533	$1,980,252,533	$22,617,557	$743,894,328	$1,236,358,204	$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.

2.5. Board Actions

- July
  - None

Future anticipated board actions include:

- Shunt wire construction
- PG&E interconnect construction

2.6. Government and Community Affairs

There were four 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 wire and overhead catenary system (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 (SWS), and seven paralleling stations (PS). Electrification infrastructure will be constructed using a DB delivery method.

Activity This Month

- Continued to install OCS foundations in Segment 3 both on and off track.
- Continued to install OCS poles, down guys, and balance weights in Segment 2.
- Installed OCS wires in Segment 2.
- Potholed at proposed OCS locations and utility locations in Segments 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 continued designing solutions for those conflicts that cannot be avoided. The conflicts must be resolved before the installation of foundations at those locations.
- Relocated signal cables found in conflict with planned OCS foundations as conflicts were identified.
- Completed installation of disconnect switches (13/13), potential transformers (9/9), and surge arrestors (11/11) at TPS-2. Continued to installed gantry enclosures (4/5), cables/pipes/wires (1,996/3,299 linear feet (LF)), and insulators (56/138).
- Continued to install ductbank (11,197/13,466 LF) at TPS-1
- Completed ductbank to Gantry interface and continued to install ductbank (1,858/3,088 LF) at PS-6.
- Continued drainage and utility installation (120/527 LF) at PS-7.
- Continued to install signal ductbank and conduits at Control Point (CP) Shark (48% complete), CP Stockton (20%), CP Ralston (59%), and CP Dumbarton (56%).
- Continued drilling of rails for impedance bond connections in Segments 1, 2, 3 and 4 at various control points and crossings.
- Continued installation of insulated joints (IJs) corridor wide.
- Continued installation of bridge attachments in Segment 2.
- Progressed the OCS design with BBII in all segments, which included submittal and review of Design Change Notices for revised foundation locations.

- Coordinated design review 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.
- Continued discussions with FRA and CPUC on grade crossing design.
- Continued to progress on the TPS interconnection design for TPS-1 and TPS-2. The interconnection is between the PG&E substations and future Caltrain main substations.
- Worked with BBII through Site Specific Work Plans (SSWP) for upcoming field work.
- Continued to work with PG&E and Silicon Valley Power (SVP) for the finalization of single phase studies.
- PG&E continued work at East Grand and FMC substations.

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[ab]	Completed this Month	Completed to Date	Required[ab]	Completed this Month	Completed to Date
1	Tunnels	32[c]	0	32[c]	31	0	0
	A	309	0	0	259	0	0
	B	237	0	0	177	0	0
2	5	243[d]	0	184	208	0	160
	4	314	0	243	253	0	186
	3	174[d]	0	60	140	6	36
	2	248	0	78[e]	205	28	38
	1	206	0	79[e]	154	10	10
3	2	530	0	0	460	0	0
	1	390	90	261	311	0	0
4	A	244	11	83	180	0	0
	B	131	0	70	124	0	0
	CEMOF	112	0	0	102	0	0
Total		**3,170**	**101**	**1,090**	**2,604**	**44**	**430**

Note:

a. Foundations required do not match poles required as guy foundations are needed in some locations for extra support.
b. The number of required poles and foundations fluctuate due to design changes.
c. The number of foundations for the Tunnels Project reduced from 34 to 32 after it was determined the two "micropiles" are not to be considered foundations.
d. 55 foundations in S2WA5 will be installed by South San Francisco and 64 foundations in S2WA3 will be installed by 25th Avenue.
e. 5 foundations (1 from S2WA1 and 4 from S2WA2) from Non-Conformance Report #17 were tested and approved.

Activity Next Month

- Continue installation of foundations in Segments 3 and 4.
- Continue resolution of DSCs.

- Continue to install protective steel plates for protection of utilities during foundation installation.
- Continue to install OCS poles, assemblies and OCS wires in Segment 2.
- 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.
- Pothole and clear obstructions at proposed OCS locations. Potholing will concentrate in Segments 3 and 4.
- Continue construction at TPS-1 and TPS-2.
- Continue construction at PS-7, PS-4, PS-6, and the Switching Station.
- Continue to install conduit and foundations for signal and wayside power cubicle units in Segments 2 and 4.
- Continue to install impedance bond connections.
- Continue to install IJs.
- Continue to install bridge attachments.
- Continue to coordinate with stakeholders on the consistent warning time solution and advance location-specific design.
- Continue to progress location-specific design for grade crossing system.
- Review BBII work plans for upcoming construction activities.
- Continue to progress design for PG&E interconnection towards 95%.
- Coordinate with PG&E on final design for PG&E infrastructure.
- Coordinate with local jurisdictions to review designs.
- 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 traction power substations (TPS), wayside power cubicles (WPC), and the OCS. SCADA will be integrated with the base operating system for Caltrain Operations and Control, which is the Rail Operations Center System. A separate control console will be established for the Power Director.

Activity This Month

- Submitted formal schedule for review and Monthly Progress Report.
- Continued preparations for demonstration of the San Jose substation portion of the SCADA system. Ground switch change will not be implemented for this demonstration.

Activity Next Month

- Prepare and deliver the Monthly Report and the Monthly Schedule Update.
- Attend project status meetings.

- Support ongoing discussions concerning RFIs.
- When final Points List is received, complete San Jose database and display to 100% and move on to remaining locations.
- Demonstration of current functionalities to project and Caltrain staff.

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

- Tunnel 4 Historic South Portal reconstruction continued with fabrication of archstone blocks and review of installation details.
- Continued remaining punch list activities.
- Continued coordination of weekly plans for field work activities.
- Continued review of and prepared responses for submittals and RFIs.

Activity Next Month

- Continue review of Tunnel 4 Historic South Portal reconstruction plans, cost proposals, and associated details.
- Install fencing above tunnel portals.
- Install additional rock bolts for areas with over-notching.
- Continue fabrication of OCS termination structures from steel shop drawings based on as-built survey of foundations and shop drawing approval.
- Review and respond to submittals, RFIs, and SSWPs as needed.
- Continue weekly coordination for field activities and associated TransitAmerica Services, Inc. (TASI) protection.
- Prepare and plan for OCS Option Scope, scheduled to begin in October 2019.

4.0 ELECTRIC MULTIPLE UNITS

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

4.1. Electric Multiple Units

The procurement of EMUs, or trainsets, from Stadler consists of a Base Order of 96 railcars, plus an Option Order of an additional 37 railcars, for a total of 133 railcars. These two orders will be combined and delivered as 19 seven-car Trainsets. The Base Order is funded from PCEP, and Option Order funded by a Transit and Intercity Rail Capital Program (TIRCP) grant.

Activity This Month

- Final Design Reviews continue to advance. Fourteen of the 17 major systems completed. Remaining three are conditionally approved. Scheduled for completion in late 2019.
- First Article Inspections (FAIs) continue; 64 total, 48 conducted, 11 closed.
- Alternate Vehicle Technology compliance (crashworthiness) validation analysis scheduled to be submitted to PCEP August 2019, and to FRA in September 2019. No known unresolved issues.
- Discussions with FRA on acceptable bike storage, flip-up seat and bike barrier designs ongoing.
- Scheduled FRA 'Compliance Review' of EMU design for September 10 and 11, and 'Sample Car Inspection' for December 2019/January 2020 timeframe. Both activities to take place in Stadler's Salt Lake City facility.
- PCEP Quality Management Plan (QMP) revised and draft circulated for comment.
- PCEP scheduling internal staff Quality Assurance training for September 4, 2019

A summary of the EMU Status by trainset is provided in Table 4-1 below.

Table 4-1 EMU Status by Train Car

Trainset #		Shells Shipped	Salt Lake City In	Salt Lake City Out	Cars at Caltrain
Trainset	1	7	7	0	0
Trainset	2	7	7	0	0
Trainset	3	7	5	0	0
Trainset	4	0	0	0	0
Trainset	5	0	0	0	0
Trainset	19	0	0	0	0
TOTAL		**21/133**	**19/133**	**0/133**	**0/133**

Activity Next Month

- Continue truck (bogie) structural and lifecycle testing.
- Continue passenger side door endurance testing.
- Redesign passenger table crashworthiness and redo crash test.
- Repeat propulsion gearbox endurance test and teardown inspection.
- Repeat last of the four floor/ceiling fire endurance tests.
- Negotiate change order with Stadler to install flip-up seats and barriers in Bike Cars.

4.2. Centralized Equipment Maintenance and Operations Facility Modifications

The CEMOF Modifications Project will provide work areas to perform maintenance on new EMUs.

Activity This Month

- Began identifying and locating underground utilities at work area.
- Continued processing submittals and RFIs.
- Roadway Worker Protection training provided to ProVen management and Consultants and subcontractors.
- Mobilized contractor to site and set up office trailer and temporary generators.
- Held pre-construction meeting.
- Documented existing conditions including video recording the construction site.
- Reviewed and approved format for application for payment.
- Approved truck access to the site.

Activity Next Month

- Finalize specifications and obtain approval for Scissor Lift Work Platform.
- Revise and obtain approval of Automatic Pantograph Inspection System.
- Locate underground utilities for excavation (ongoing).
- Contractor to submit application for required permits with various government agencies (ongoing).
- Identify construction site boundary and install temporary fences and safety barricades.
- Pending schedule approval, issue Notice to Proceed (NTP) and start construction work.

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

- Project staff provided input and continued its participation in the BBII 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.
- Conducted the monthly project Safety and Security Certification and Fire/Life Safety Meetings.
- Participated in the FTA Quarterly Meeting and provided an update on the project safety and security activities.
- Initiated SSWP and Job Hazard Analysis reviews for the pending CEMOF project work.
- Performed a review of the status of the Safety and Security Management Plan requirements with the BBII contractor safety staff.
- Investigated project incident occurrences and worked with the BBII contractor to identify incident root causes and develop safety and security mitigation measures.
- Conducted ongoing safety inspections of contractor field activities.
- Participated in weekly project coordination meetings with the contractor to review open issues and recommended action items.
- Performed contractor equipment inspections of the new work equipment being deployed for the project.

Activity Next Month

- Monthly safety communication meetings continue to be scheduled for the Project Safety and Security Certification Committee, Fire/Life Safety Committee, Rail Activation Committee, and other project-related contractor and JPB safety meetings to discuss safety priorities.
- 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.

  Continue to meet with the PCEP contractors, JPB safety, and TASI to identify opportunities to further improve project safety performance and continue to reinforce lessons learned safety mitigation recommendations resulting from prior project incidents.

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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 a field activities audit of BBII on second shift. The audit covered all quality assurance and control functions as prescribed by the FTA Quality System Guidelines, and included BBII's QMP, OCS Foundations, underground ductwork and structures, and OCS Bridge Attachments. There were two findings and no observations.
- One design package audit of PGH Wong was conducted with no findings or observations.
- Reviewed the Stadler response to the Corrective Action Request (CAR) issued in April for inadequate "cause" and "corrective action" on Stadler-generated NCRs. The response was rejected and returned for further actions.
- A CAR was issued to ProVen for lack of implementation of their non-conformance system as required by FTA guidelines and their own QMP.

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	2	96
Audit Findings		
Audit Findings Issued	2	62
Audit Findings Open	0	0
Audit Findings Closed	2	62
Non-Conformances		
Non-Conformances Issued	0	8
Non-Conformances Open	0	0
Non-Conformances Closed	0	8

Activity Next Month

- Two design package audits of PGH Wong are planned.
- An audit of the Structural Steel Products manufacturing facility in Dallas, Texas is planned. This includes the OCS assemblies, gantry steel and OCS poles.
- Review ProVen's response to the CAR for lack of implementation of non-conformance system needed to properly document construction discrepancies.

7.0 SCHEDULE

The overall schedule remains unchanged from last month. The forecasted Revenue Service Date (RSD) remains May 2022. The program critical path runs through the manufacturing and testing of EMU trainsets.

Shown below, Table 7-1 indicates major milestone dates for the MPS.

Table 7-1 Schedule Status

Milestones	Program Plan	Progress Schedule (June 2019)[1]
Segment 4 Completion	11/21/2019	05/22/2020[2]
○ Interconnection from PG&E Substation to Traction Power Substation (TPS)	N/A	04/27/2020
Arrival of First Vehicle in Pueblo, CO	N/A	05/29/2020[2]
Arrival of First Vehicle at JPB	07/29/2019	02/26/2021[2]
PG&E Provides Permanent Power	09/09/2021	09/09/2021
Electrification Substantial Completion	08/10/2020	12/31/2021[2]
Start Phased Revenue Service	N/A	01/03/2022[2]
RSD (w/o Risk Contingency)	12/09/2021	05/06/2022
FFGA RSD (w/ Risk Contingency)	08/22/2022	08/22/2022

Note:

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

Notable Variances

During this monthly progress reporting period, BBII is currently reporting an overall delay to substantial completion, including the intermediate milestone of Segment 4/Test Track completion. The delay is primarily due to the time it has taken to finalize the modifications required for the signal system, the effect that differing site conditions (DSCs) are having on OCS foundation installation and design completion of the Traction Power Substation (TPS) interconnect.

JPB continues to work with and is urging BBII to accelerate resolution of these issues. In the meantime, the JPB forecasted date for BBII's completion has been updated to reflect the inclusion of the signal system work which has been impacted by CWT.

Additional delays have been experienced by Stadler during assembly of the first trainset. The resulting effect is a delay to arrival of the first trainset at JPB, however there is no anticipated effect on the overall vehicle schedule at this time.

Items listed in Table 7-2 reflect the critical path activities/milestones for the PCEP.

Table 7-2 Critical Path Summary

Activity	Start	Finish
Manufacturing, Testing & Acceptance of Trainsets 1 - 14	08/13/2018	05/06/2022
RSD w/out Risk Contingency	05/06/2022	05/06/2022
FFGA RSD w/ Risk Contingency	08/22/2022	08/22/2022

Schedule Hold Points

Schedule Hold Points (SHP) represent key milestones on or near a schedule's critical path that are used as measurement points with respect to contingency drawdown. Delays to these key milestones have the potential to require a program to utilize available contingency. Table 7-3 below reflects the SHPs for the PCEP program schedule. The dates indicated reflect the planned completion dates for each SHP.

Table 7-3 Schedule Hold Points

Schedule Hold Point (SHP)	Date
FTA/PMOC Risk Refresh	08/30/2016 (A)
Begin EMU Manufacturing	12/04/2017 (A)
Arrival of 1st Trainset in Salt Lake City	02/04/2019 (A)
Segment 4 Completion	05/22/2020
Arrival of 1st Trainset in Pueblo, CO	05/29/2020
Arrival of 1st Trainset at JPB	02/26/2021
Conditional Acceptance of 1st Trainset	04/09/2021
System Electrified	12/31/2021
Begin Phased Revenue Service	01/03/2022
Conditional Acceptance of 14th Trainset	05/06/2022
FFGA RSD w/ Risk Contingency	08/22/2022

Note: "(A)" denotes an actual completion

8.0 BUDGET AND EXPENDITURES

The summary of overall budget and expenditure status for the PCEP and Third Party Improvements is shown in the following tables. Table 8-1 reflects the Electrification budget, Table 8-2 the EMU budget, Table 8-3 the overall PCEP budget, and Table 8-4 Third Party Improvements 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	$722,365,557	$9,684,824	$328,410,242	$393,955,315	$722,365,557
SCADA	$0	$3,446,917	$0	$1,934,371	$1,512,546	$3,446,917
Tunnel Modifications	$11,029,649	$42,243,966	$941,617	$23,669,951	$18,574,015	$42,243,966
Real Estate	$28,503,369	$28,503,369	$125,404	$20,363,426	$8,139,943	$28,503,369
Private Utilities	$63,515,298	$92,451,380	$2,943,972	$55,139,720	$37,311,660	$92,451,380
Management Oversight [5]	$141,506,257	$140,822,289	$2,167,217	$118,591,649	$22,230,640	$140,822,289
Executive Management	$7,452,866	$6,214,226	$173,296	$6,995,593	($781,367)	$6,214,226
Planning	$7,281,997	$7,281,997	$13,699	$5,647,248	$1,634,749	$7,281,997
Community Relations	$2,789,663	$2,789,663	$21,741	$1,435,393	$1,354,270	$2,789,663
Safety & Security	$2,421,783	$2,421,783	$86,907	$2,506,797	($85,014)	$2,421,783
Project Management Services	$19,807,994	$19,807,994	$142,143	$11,415,107	$8,392,887	$19,807,994
Engineering & Construction	$11,805,793	$11,805,793	$408,836	$8,080,860	$3,724,933	$11,805,793
Electrification Eng & Mgmt	$50,461,707	$50,461,707	$743,082	$41,567,184	$8,894,523	$50,461,707
IT Support	$312,080	$331,987	$0	$407,170	($75,183)	$331,987
Operations Support	$1,445,867	$1,980,632	$11,164	$2,194,079	($213,447)	$1,980,632
General Support	$4,166,577	$4,166,577	$139,876	$4,631,681	($465,104)	$4,166,577
Budget / Grants / Finance	$1,229,345	$1,229,345	$28,535	$1,288,970	($59,625)	$1,229,345
Legal	$2,445,646	$2,445,646	$335,295	$4,028,713	($1,583,067)	$2,445,646
Other Direct Costs	$5,177,060	$5,177,060	$62,643	$3,684,976	$1,492,084	$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	$1,320,776	$27,563,805	$27,711,278	$55,275,084
Insurance	$3,500,000	$4,305,769	$0	$3,558,530	$747,238	$4,305,769
Environmental Mitigations	$15,798,320	$14,972,644	$25,000	$690,411	$14,282,234	$14,972,644
Required Projects	$17,337,378	$14,232,378	$0	$735,880	$13,496,498	$14,232,378
Maintenance Training	$1,021,808	$1,021,808	$0	$0	$1,021,808	$1,021,808
Finance Charges	$5,056,838	$6,137,156	$53,429	$3,583,644	$2,553,512	$6,137,156
Contingency	$276,970,649	$190,346,891	$0	$0	$158,151,422	$158,151,422
Forecasted Costs and Changes	$0	$0	$0	$0	$32,195,469	$32,195,469
ELECTRIFICATION SUBTOTAL	**$1,316,125,208**	**$1,316,125,208**	**$17,262,240**	**$584,241,629**	**$731,883,579**	**$1,316,125,208**

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.
4. Cost To Date for “Electrification” includes 5% for Contractor’s retention until authorization of retention release.
5. The agency labor is actual through June 2019 and accrued for July 2019.

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	$553,898,897	$4,753,440	$119,726,736	$434,172,161	$553,898,897
CEMOF Modifications	$1,344,000	$6,550,777	$0	$0	$6,550,777	$6,550,777
Management Oversight [4]	$64,139,103	$63,379,937	$569,130	$37,238,287	$26,141,651	$63,379,937
Executive Management	$5,022,302	$4,263,136	$99,734	$4,368,761	($105,625)	$4,263,136
Community Relations	$1,685,614	$1,685,614	$13,325	$565,928	$1,119,686	$1,685,614
Safety & Security	$556,067	$556,067	$9,899	$453,823	$102,244	$556,067
Project Mgmt Services	$13,275,280	$13,275,280	$87,120	$7,431,945	$5,843,335	$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	$223,965	$17,300,258	$14,782,298	$32,082,556
IT Support	$1,027,272	$1,027,272	$11,636	$505,326	$521,946	$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	$51,605	$2,014,172	$585,375	$2,599,547
Budget / Grants / Finance	$712,123	$712,123	$28,989	$843,002	($130,879)	$712,123
Legal	$1,207,500	$1,207,500	$4,818	$1,221,625	($14,125)	$1,207,500
Other Direct Costs	$4,003,139	$4,003,139	$38,039	$2,232,428	$1,770,711	$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	$491,250	$4,008,750	$4,500,000
Finance Charges	$1,941,800	$3,761,482	$32,747	$2,196,427	$1,565,055	$3,761,482
Contingency	$38,562,962	$29,296,231	$0	$0	$25,690,231	$25,690,231
Forecasted Costs and Changes	$0	$0	$0	$0	$3,606,000	$3,606,000
EMU SUBTOTAL	**$664,127,325**	**$664,127,325**	**$5,355,317**	**$159,652,699**	**$504,474,625**	**$664,127,325**

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.
4. The agency labor is actual through June 2019 and accrued for July 2019.

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**	**$17,262,240**	**$584,241,629**	**$731,883,579**	**$1,316,125,208**
EMU Subtotal	**$664,127,325**	**$664,127,325**	**$5,355,317**	**$159,652,699**	**$504,474,625**	**$664,127,325**
PCEP TOTAL	**$1,980,252,533**	**$1,980,252,533**	**$22,617,557**	**$743,894,328**	**$1,236,358,204**	**$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.

Table 8-4 Third Party Improvements/CNPA 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)
CHSRA Early Pole Relocation	$1,000,000	$1,000,000	$12,500	$687,776	$312,224	$1,000,000
PS-3 Relocation (Design)	$500,000	$500,000	$0	$150,000	$350,000	$500,000
TPSS-2 Pole Relocation (Design)	$110,000	$110,000	$22,000	$88,000	$22,000	$110,000
EMU Option Cars	$172,800,047	$172,800,047	$0	$32,280,005	$140,520,042	$172,800,047
CNPA TOTAL	**$174,410,047**	**$174,410,047**	**$34,500**	**$33,205,781**	**$141,204,266**	**$174,410,047**

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 paid this month.
3. Column D "Cost To Date" includes actuals (amount paid) to date.

Table 8-4 shows improvements outside of the scope of PCEP that are funded with non-PCEP funds. These improvements are implemented through the PCEP contracts. In FTA terminology, these efforts are categorized as Concurrent Non-Project Activities (CNPA).

- CHSRA Early Pole Relocation: Relocation of 196 OCS poles as part of PCEP. Implementing these pole relocations minimizes future cost and construction impacts. This scope is funded by the CHSRA.
- PS-3 Relocation (Design): Relocate PS-3 (Burlingame) as part of PCEP to avoid a future conflict with the Broadway Grade Separation Project (BGSP). This scope is funded by the BGSP.
- TPSS-2 Pole Relocation (Design): Design changes due to the relocation of VTA/BART Pole at TPSS-2 location. This scope is funded by the VTA.
- EMU Option Cars: Exercise Stadler Contract Option for 37 additional EMUs. This scope is funded with a combination of TIRCP and matching local funds.

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.

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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 five PCEP contracts are BBII, CEMOF, Stadler, SCADA and Tunnel Modifications.

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
07/01/2019	BBI-053-CCO-040B Rev1	Bid Item 9 Utilities Potholing	$1,867,700	$1,867,700
07/10/2019	BBI-053_CCO-033 Rev1	PS-3 Site Relocation (Design Only)	$500,000	$500,000
		Total	**$2,367,000**	**$2,367,700**

[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			
		Total	**$0**	**$0**

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

CEMOF Contract

Change Order Authority (10% of ProVen Contract) **10% x $6,550,777 = $655,078**

Date	Change Number	Description	CCO Amount	Change Order Authority Usage
	None			
		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**

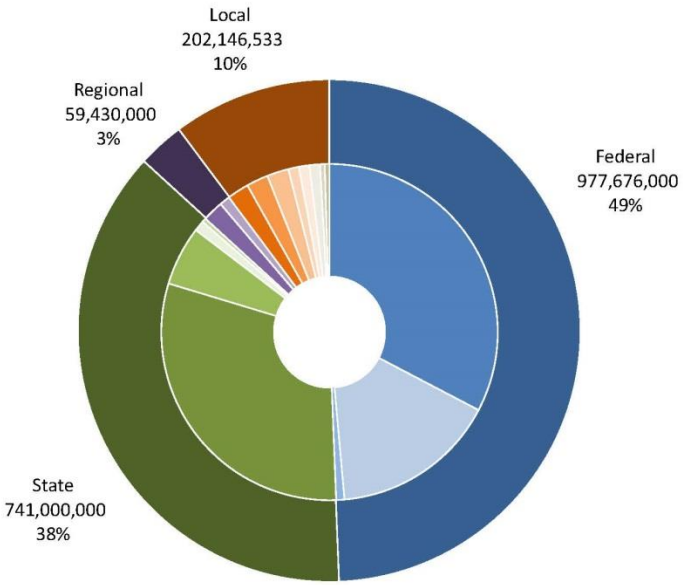
Date	Change Number	Description	CCO Amount	Change Order Authority Usage
06/28/2019	PROV-070-CCO-008	Micropiles at Tunnel-2 South (T-2S)	$41,322	$41,322
06/28/2019	PROV-070-CCO-010	Salvage Transition Panels	$6,144	$6,144
06/28/2019	PROV-070-CCO-011	Demo PVC and Plug at Tunnel-1 South (T-1S)	$4,035	$4,035
06/28/2019	PROV-070-CCO-020	Unidentified Storm drain Conflict with Junction Inlet	$1,976	$1,976
		Total	**$53,477**	**$53,477**

[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).

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. During the last month, FTA awarded amendments to include $67 million in Fiscal Year 2019 Section 5307 formula funds, and the next $100 million in Core Capacity funds, in the existing grants for 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. Design and construction of grade crossing modifications that meets stakeholder and regulatory requirements may cost more than was budgeted and delay the revenue service date.
2. Contractor sequencing of early utility location, preliminary design, and foundation construction may result in inefficiencies in construction, redesign, and reduced production rates.
3. Extent of differing site conditions and delays in resolving differing site conditions result in delays to the completion of Electrification contract and increases program costs.
4. Track access does not comply with contractor-stipulated work windows.
5. Major program elements may not be successfully integrated with existing operations and infrastructure in advance of revenue service.
6. Potential that modifications to the PTC database and signal software are not completed in time for cutover and testing.
7. Additional property acquisition is necessitated by change in design.
8. Rejection of Design Variance Request (DVR) for Auto Transformer Feeder (ATF) and static wires results in cost and schedule impacts to PCEP.
9. Changes to PTC implementation schedule could delay completion of electrification work.

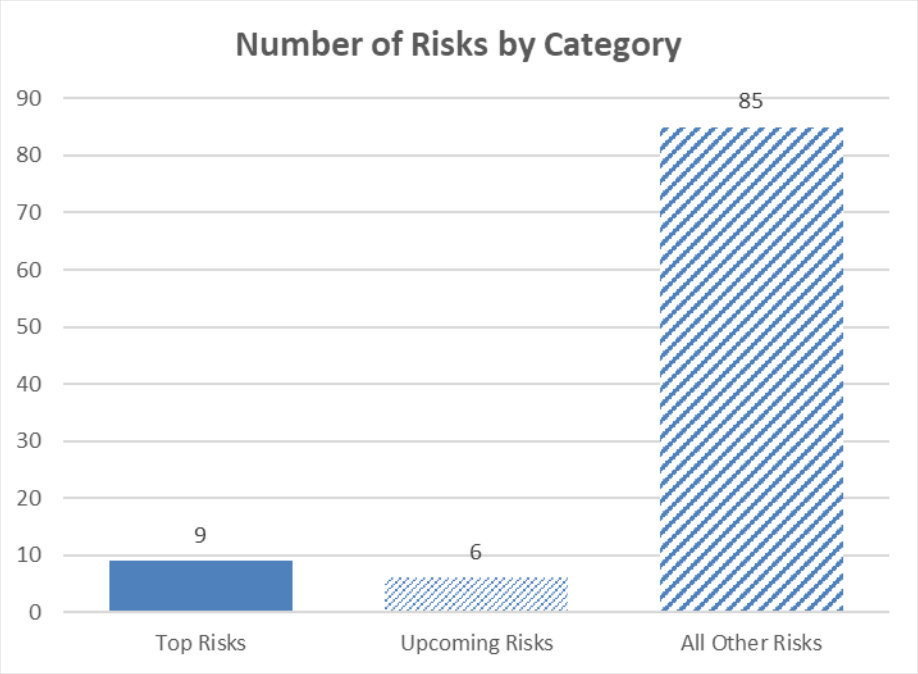
Activity This Month

- Updated 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.
- Updated risk retirement dates 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.

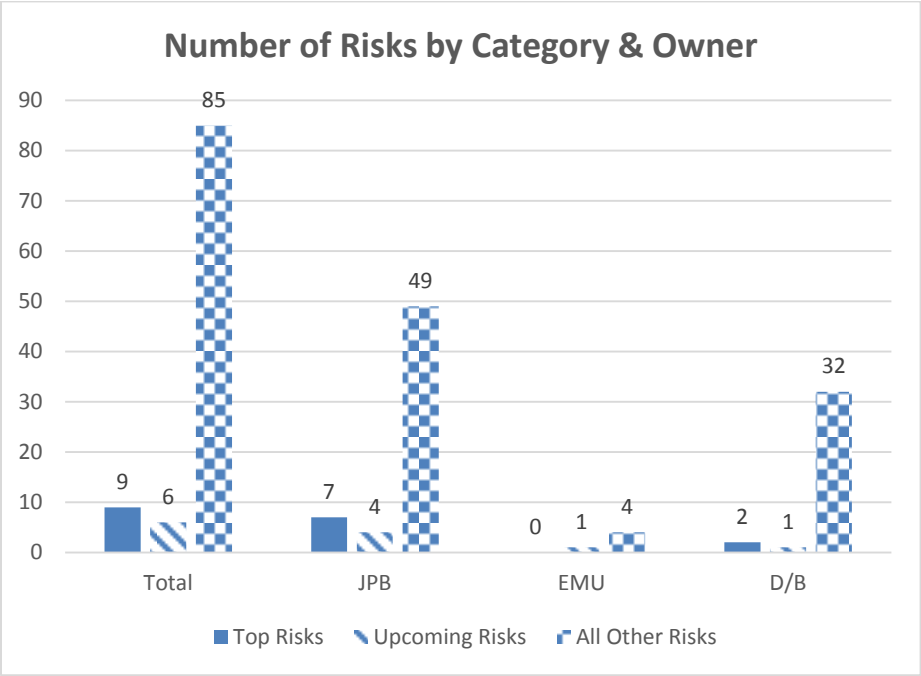
Figures 11-1 and 11-2 show the risks identified for the program. Risks are categorized as top risk, upcoming risk, and all other risks. The categories are based on a rating scale composed of schedule and cost factors. Top risks are considered to have a significantly higher than average risk grade. Upcoming 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 = 100

Figure 11-2 Risk Classification



Total Number of Active Risks = 100

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.
- Update contractor-owned risks and return to BBII for review.
- Convene Risk Assessment Committee meeting.
- Complete risk analysis report for cost and schedule impacts based on updated risk register and finalize Risk Register Refresh Technical Memorandum.

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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, potholing for utility location, duct bank and manhole installation, tree trimming/removal, conduit installation, directional boring, signal cable removal, etc.) occurring in areas that required environmental compliance 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.
- Protocol-level surveys for sensitive avian species continued at previously identified potential habitat locations.

- Best management practices (BMP) installation (e.g., silt fencing, straw wattles, soil covers) occurred at equipment staging areas and other work areas throughout the alignment in accordance with the project-specific Stormwater Pollution Prevention Plan (SWPPP).

Activity Next Month

- Environmental compliance monitors will continue to monitor project activities (OCS pole foundation installation, potholing for utility location, duct bank and manhole installation, tree trimming/removal, conduit installation, signal case installation, abandoned signal cable removal, cone penetration testing, etc.) occurring in areas that require environmental compliance monitoring in an effort to minimize potential impacts on sensitive environmental resources in accordance with the MMRP.
- 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.
- Pre-construction nesting bird surveys during the nesting bird season will continue (nesting bird season is defined as February 1 through September 15).
- BMPs installation will continue in accordance with the project-specific SWPPP.
- 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 pending site access and is anticipated to begin in mid-2019.

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

- Worked with all utilities on review of overhead utility line relocations based on the current design.
- Coordinated with individual utility companies on relocation plans and schedule for incorporation with Master Program Schedule.
- Coordinated work with communications utilities on review of relocation design.
- Continued to coordinate relocation work for SVP and Palo Alto Power facilities.
- Continued to coordinate relocation by communication cable owners such as AT&T and Comcast.
- Completed PG&E relocations for all Segments with exception of corrections.
- Conducted weekly utility coordination meeting to discuss overall status and areas of potential concern from the utilities.

Activity Next Month

- 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 to review relocation design SVP, Palo Alto Power, and communications companies and coordinate relocation field work.
- Continue communication relocations in all Segments.
- Continue SVP and Palo Alto Power relocations in Segment 3.
- Conduct monthly and weekly utility meeting with utility owners.

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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 Right of Way (ROW) for the PCEP, but in certain locations, will need to acquire small portions of additional real estate to expand the 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 remain only five 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.
- One in Segment 3 for which we are applying for a permit from Santa Clara Valley Water District (SCVWD).
- One parcel in Segment 2.
    - The site is owned by UPRR, which has issued a permit.
- Four that are in redesign.
    - SWS-1, needed in February 2019.
        - Owned by SamTrans, which has agreed to issue a permit upon approval of design.
    - One parcel 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 as soon as possible.
    - 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 four new parcels to date.

Activity This Month

- Finalized maps with modified electrical safety zone easement for Willowbend. Appraiser assigned to start appraisal update.
- Staff reviewing potential new pole locations and providing feedback to the design team.
- Working with property owners for Segment 3 and 4 to enable potholing.
- Site walk with SCVWD to review installation of foundations.

- Presented first written offer (FWO) package to Diridon Hospitality. Working with City of San Jose and Diridon Hospitality to finalize design.
- Staff is actively working with PG&E and VTA to gain access to their properties for potholing.
- Finalized appraisal map for Britannia Gateway.
- Working with UPRR on encroachment permit and/or easement.

Activity Next Month

- Continue to negotiate for all open parcels.
- Obtain encroachment permit from SCVWD.
- Work with City of San Jose to resolve underlying street interests.
- Present updated appraisal maps to PG&E for their approval regarding the Britannia Gateway parcel.
- Present FWO to the City of Belmont.
- Continue to work with Segment 3 and 4 owners for early access to pothole.
- Make offers on the parcel for which appraisals have been completed.
- Actively participate in Foundation/Pothole and Gannett Fleming weekly meetings.
- Continue to work with project team to identify and analyze new potential parcels.
- Map newly identified parcels.

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	Executed
		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

- Local Policy Makers Group
- Caltrain Accessibility Advisory Committee
- San Jose Community Meeting – CEMOF Modifications
- San Jose Community Meeting – Gardner Community Center Update

Third Party/Stakeholder Actions

- Mountain View OCS Foundation and Pole Locations – 95%

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17.0 DISADVANTAGED BUSINESS ENTERPRISE (DBE) PARTICIPATION AND LABOR STATISTICS

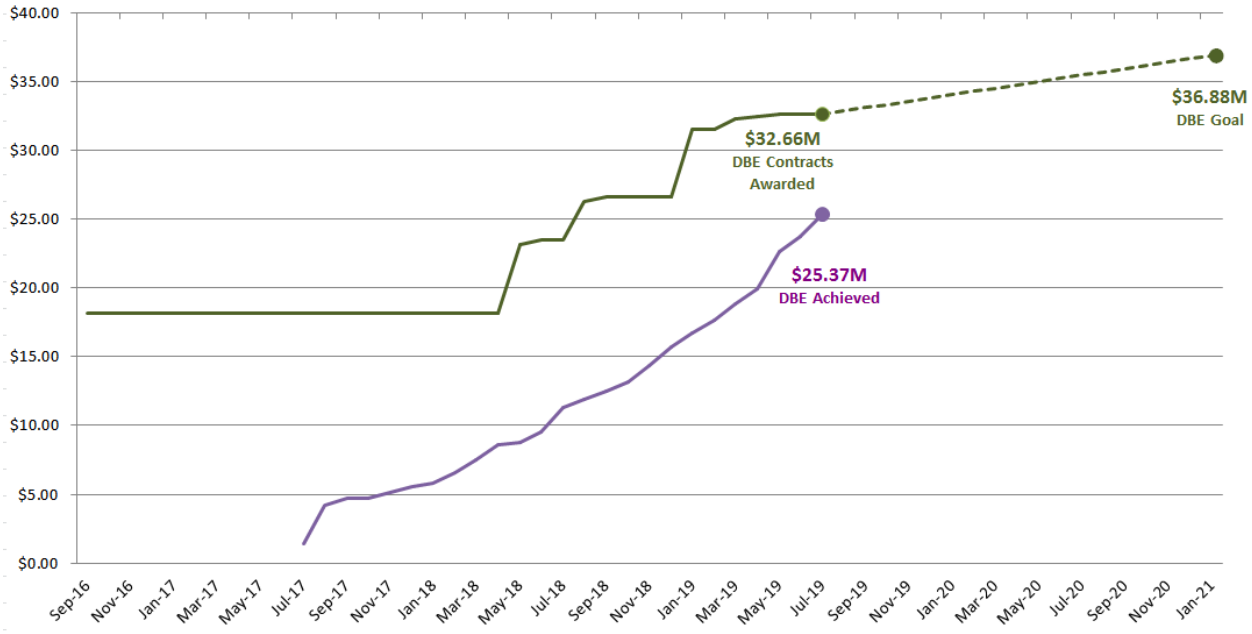
BBII proposed that 5.2% ($36,884,154) of the total DB contract value ($709,310,651) would be subcontracted to DBEs.

Activity This Month

As expressed in Figure 17-1 below, to date:

- **$25,372,283** has been paid to DBE subcontractors.
- **3.6%** has been achieved.

Figure 17-1 DBE Participation



Activity Next Month

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

"In the month of August, 2019, we continue to anticipate increasing our DBE commitments to firms who we are currently negotiating pricing on proposed work or Professional Services Agreements. We are optimistic about the prospect of making future awards to DBE firms. 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:

- None

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/Contract Amendments:

- None

Upcoming IFB/RFQ/RFP to be Issued:

- RFQ – Scissor Lift Work Platform
- RFP – Pantograph Monitoring and Inspection System

Existing Contracts Amendments Issued:

- None

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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)
2019	JPB approves contract award to ProVen for CEMOF modifications (February)
	JPB approves LNTP to ProVen for CEMOF modifications (April)

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**
CNPA	**Concurrent Non-Project Activity**
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
SSCP	Safety and Security Certification Plan
SSMP	Safety and Security Management Plan
SSWP	Site Specific Work Plan

SWS	**Switching Station**
TASI	**TransitAmerica 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 31, 2019

Agency	CHSRA	MTC	SFCTA/SFMTA/CCSF	SMCTA	VTA
FTA Quarterly Meeting	• Bruce Armistead • Boris Lipkin • Simon Whitehorn • Ian Ferrier (info only) • Wai Siu (info only)	• Anne Richman	• Luis Zurinaga	• April Chan • Peter Skinner	• Jim Lawson
Funding Partners Quarterly Meeting	• Bruce Armistead • Boris Lipkin • Simon Whitehorn • John Popoff	• Trish Stoops	• Luis Zurinaga	• April Chan • Peter Skinner	• Krishna Davey
Funding Oversight (monthly)	• Kelly Doyle	• Anne Richman • 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 • Simon Whitehorn	• Trish Stoops • Kenneth Folan	• Luis Zurinaga • Tilly Chang (info only)	• Joe Hurley	• Krishna Davey • Jim 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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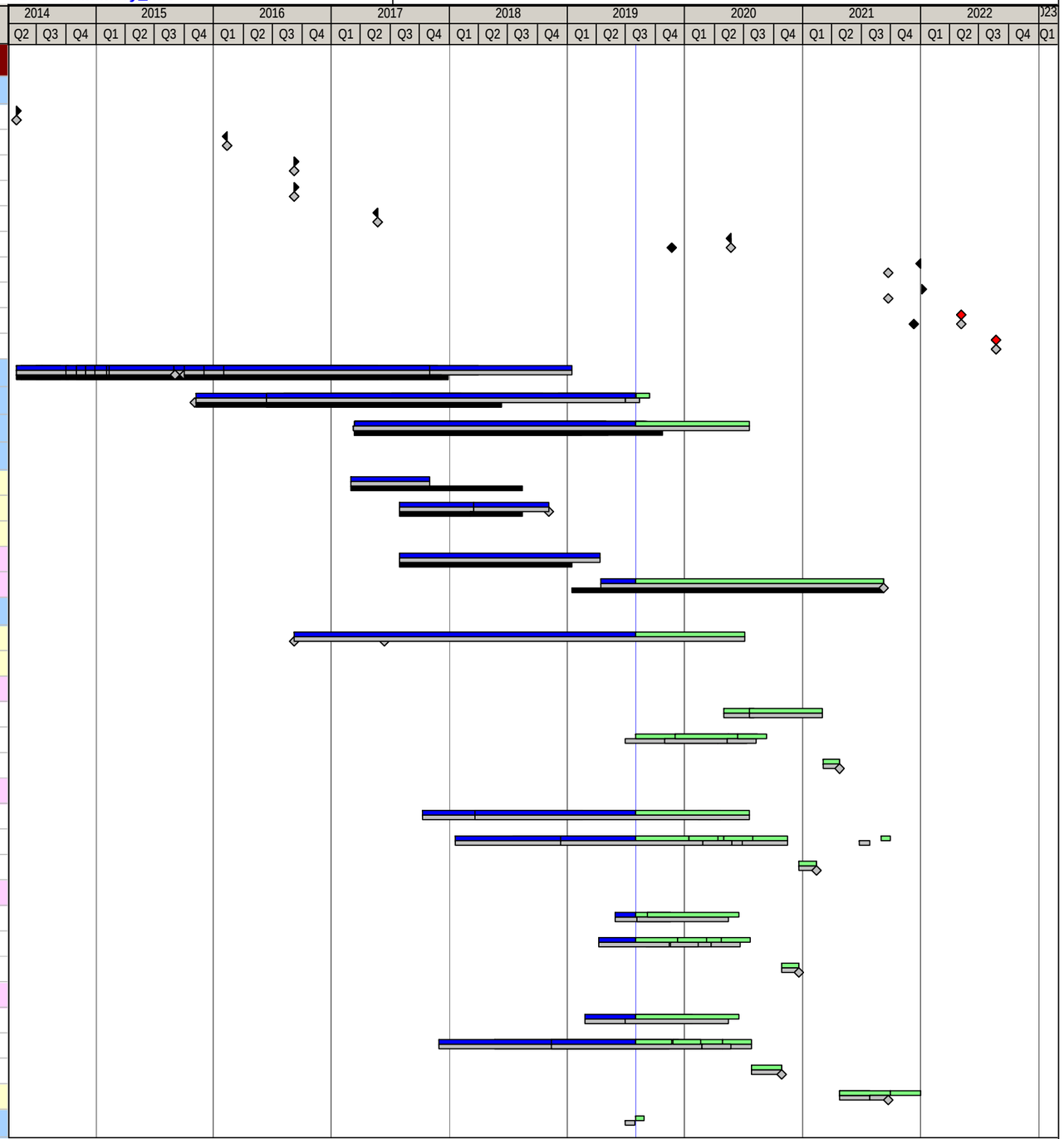
#	Activity Name	Duration	Start	Finish
1	**MASTER PROGRAM SCHEDULE C18.06**	2168d	05-01-14 A	08-22-22
2	**MILESTONES**	2168d	05-01-14 A	08-22-22
3	Start	0d	05-01-14 A	
4	NEPA Reevaluation Complete	0d		02-11-16 A
5	LNTP to Electrification Contractor	0d	09-06-16 A	
6	LNTP to Vehicle Manufacturer	0d	09-06-16 A	
7	FTA Issues FFGA	0d		05-23-17 A
8	Segment 4 (incl. Test Track) Complete	0d		05-22-20
9	Electrification Substantial Completion	0d		12-31-21
10	Start Phased Revenue Service	0d	01-03-22	
11	Revenue Service Date (RSD) w/out Risk Contingency	0d		05-06-22
12	Revenue Service Date (RSD) w/ Risk Contingency (FFGA RSD)	0d		08-22-22
13	**PLANNING / APPROVALS**	1230d	05-01-14 A	01-16-19 A
14	**REAL ESTATE ACQUISITION**	978d	11-05-15 A	09-12-19
15	**OVERHEAD UTILITY RELOCATION (Various)**	852d	03-10-17 A	07-17-20
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	**PERMANENT POWER**	1044d	08-01-17 A	09-09-21
20	***DESIGN & PERMITTING***	431d	08-01-17 A	04-12-19 A
21	***CONSTRUCTION***	612d	04-15-19 A	09-09-21
22	**ELECTRIFICATION (BBII)**	1389d	09-06-16 A	12-31-21
23	**DESIGN**	999d	09-06-16 A	07-05-20
24	**CONSTRUCTION**	1453d	10-09-17 A	09-30-21
25	***Segment 1***	635d	08-01-19	04-26-21
26	**OCS**	309d	04-29-20	03-03-21
27	**Traction Power**	406d	08-01-19	09-09-20
28	**Segment Testing**	54d	03-04-21	04-26-21
29	***Segment 2***	1453d	10-09-17 A	09-30-21
30	**OCS**	1015d	10-09-17 A	07-19-20
31	**Traction Power**	1351d	01-19-18 A	09-30-21
32	**Segment Testing**	54d	12-19-20	02-11-21
33	***Segment 3***	621d	04-09-19 A	12-19-20
34	**OCS**	385d	05-28-19 A	06-15-20
35	**Traction Power**	471d	04-09-19 A	07-22-20
36	**Segment Testing**	54d	10-27-20	12-19-20
37	***Segment 4***	1061d	12-01-17 A	10-26-20
38	**OCS**	477d	02-25-19 A	06-15-20
39	**Traction Power**	969d	12-01-17 A	07-26-20
40	**Segment Testing**	92d	07-27-20	10-26-20
41	**TESTING**	249d	04-26-21	12-31-21
42	**DRILL TRACK (TASI)**	20d	08-01-19	08-28-19

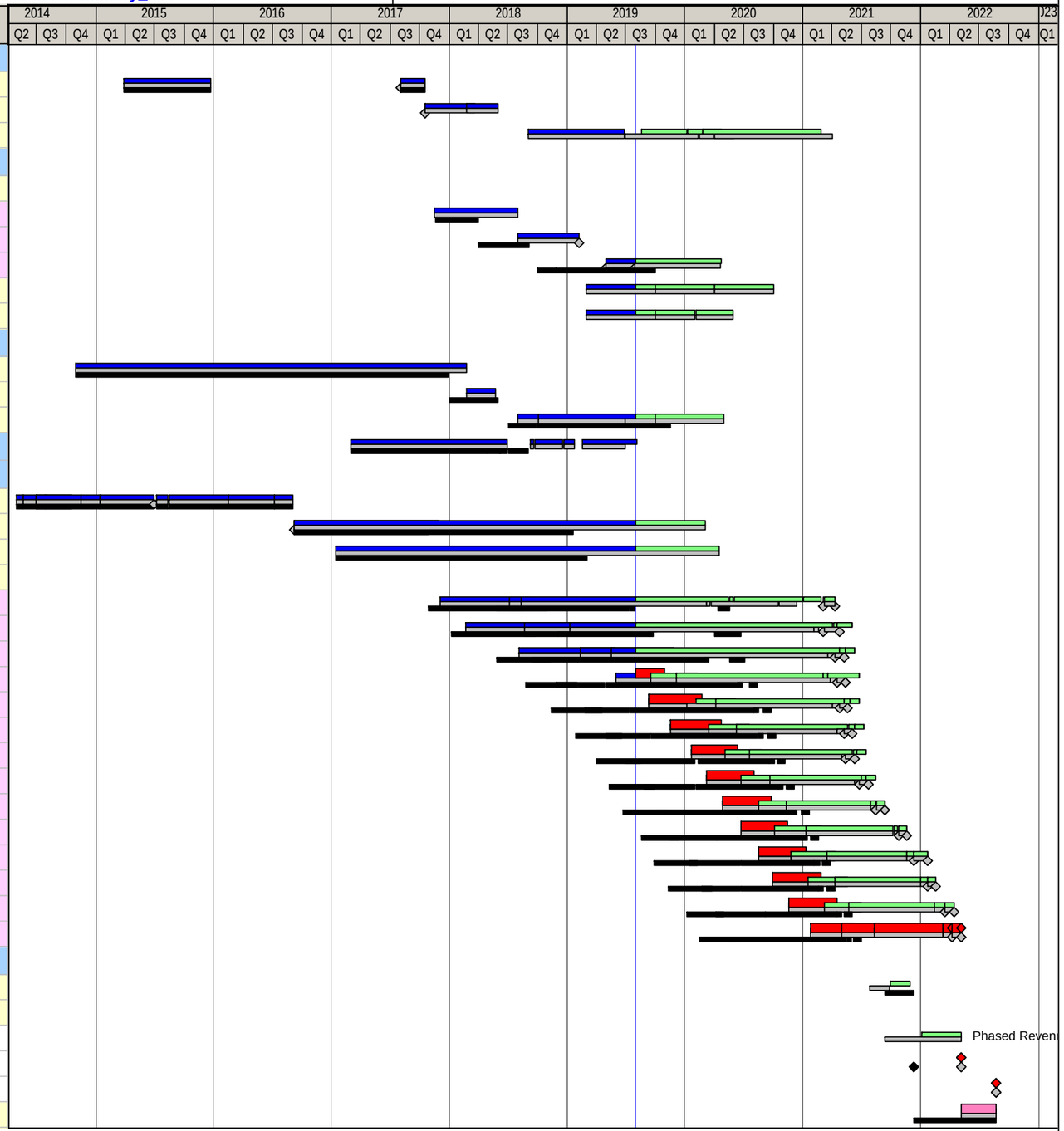


Actual Level of Effort | Progress | Critical | Prog Plan (C16.00) | Risk Contingency
Prog Plan (C16.00) | Remaining | Start Milestone | Last Months Update
Last Months Update | Near Critical | Finish Milestone | Critical Milestone

Filename: _C18.06 082319

JULY 2019 SCHEDULE UPDATE IS DRAFT UNTIL FINALIZED AT AUGUST 2019 MONTH END

#	Activity Name	Duration	Start	Finish
43	**SCADA (Arinc)**	1502d	03-30-15 A	02-25-21
44	**PREPARE SOLE SOURCE & AWARD**	649d	03-30-15 A	10-16-17 A
45	**DESIGN**	157d	10-16-17 A	05-31-18 A
46	**IMPLEMENTATION, TEST, INSTALL & CUTOVER**	630d	09-04-18 A	02-25-21
47	**CEMOF (Various)**	750d	11-16-17 A	09-30-20
48	**CEMOF MODIFICATIONS (ProVen)**	637d	11-16-17 A	04-25-20
49	***DESIGN***	178d	11-16-17 A	07-31-18 A
50	***BID & AWARD***	132d	08-01-18 A	02-07-19 A
51	***CONSTRUCTION***	260d	04-29-19 A	04-25-20
52	**PANTORGRAPH INSPECTION & MONITORING SYSTEM (Ctr TBD)**	404d	03-01-19 A	09-30-20
53	**SCISSOR LIFT WORK PLATFORM (Ctr TBD)**	318d	03-01-19 A	05-29-20
54	**TUNNEL MODIFICATION (ProVen)**	1435d	10-31-14 A	04-30-20
55	**DESIGN**	840d	10-31-14 A	02-22-18 A
56	**BID & AWARD**	66d	02-23-18 A	05-25-18 A
57	**CONSTRUCTION**	457d	08-01-18 A	04-30-20
58	**ELECTRIC LOCOMOTIVE (Amtrak / Mitsui)**	633d	03-01-17 A	08-04-19
59	**EMU (Stadler)**	2092d	05-01-14 A	05-06-22
60	**DEVELOP RFP, BID & AWARD**	612d	05-01-14 A	09-02-16 A
61	**DESIGN**	913d	09-06-16 A	03-05-20
62	**PROCUREMENT (Material)**	849d	01-16-17 A	04-16-20
63	**MANUFACTURING & TESTING**	1155d	12-04-17 A	05-06-22
64	***TRAINSET 1***	875d	12-04-17 A	04-09-21
65	***TRAINSET 2***	857d	02-22-18 A	06-04-21
66	***TRAINSET 3***	745d	08-06-18 A	06-11-21
67	***TRAINSET 4***	540d	06-03-19 A	06-25-21
68	***TRAINSET 5***	470d	09-09-19	06-25-21
69	***TRAINSET 6***	430d	11-18-19	07-09-21
70	***TRAINSET 7***	390d	01-20-20	07-16-21
71	***TRAINSET 8***	375d	03-09-20	08-13-21
72	***TRAINSET 9***	360d	04-27-20	09-10-21
73	***TRAINSET 10***	370d	06-22-20	11-19-21
74	***TRAINSET 11***	375d	08-17-20	01-21-22
75	***TRAINSET 12***	365d	09-28-20	02-18-22
76	***TRAINSET 13***	370d	11-16-20	04-15-22
77	***TRAINSET 14***	335d	01-25-21	05-06-22
78	**TESTING & STARTUP (JPB)**	232d	10-01-21	08-22-22
79	**PRE-REVENUE TESTING**	61d	10-01-21	11-30-21
80	**REVENUE OPERATIONS**	166d	01-03-22	08-22-22
81	Phased Revenue Service	90d	01-03-22	05-06-22
82	Revenue Service Date (RSD) w/out Risk Contingency	0d		05-06-22
83	Revenue Service Date (RSD) w/ Risk Contingency (FFGA RSD)	0d		08-22-22
84	**RISK CONTINGENCY**	108d	05-07-22	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: _C18.06 082319

JULY 2019 SCHEDULE UPDATE IS DRAFT UNTIL FINALIZED AT AUGUST 2019 MONTH END

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	**$28,143,966**	**$941,617**	**$23,669,951**	**$4,574,015**	**$28,243,966**
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	$25,643,966	$941,617	$23,669,951	$1,974,015	$25,643,966
10.07 Allocated Contingency	$0	$0	$0	$0	$0
30 - SUPPORT FACILITIES: YARDS, SHOPS, ADMIN. BLDGS	**$7,050,777**	**$0**	**$0**	**$7,050,777**	**$7,050,777**
30.03 Heavy Maintenance Facility	$6,550,777	$0	$0	$6,550,777	$6,550,777
30.03 Allocated Contingency	$0	$0	$0	$0	$0
30.05 Yard and Yard Track	$500,000	$0	$0	$500,000	$500,000
40 - SITEWORK & SPECIAL CONDITIONS	**$265,424,916**	**$4,314,090**	**$127,674,760**	**$137,961,444**	**$265,636,203**
40.01 Demolition, Clearing, Earthwork	$3,077,685	$0	$2,946,000	$131,685	$3,077,685
40.02 Site Utilities, Utility Relocation	$91,128,599	$2,935,565	$52,250,913	$36,704,686	$88,955,599
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	$0	$3,800,000	$775,000	$4,575,000
40.04 Environmental mitigation, e.g. wetlands, historic/archeologic, parks	$32,579,208	$57,750	$1,400,420	$31,178,788	$32,579,208
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	$764,933	$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	$114,212,209	$1,320,776	$67,277,427	$47,144,069	$114,421,496
40.08 Allocated Contingency	$20,610,000	$0	$0	$20,410,000	$20,410,000
50 - SYSTEMS	**$521,133,064**	**$7,663,906**	**$91,235,242**	**$437,777,904**	**$529,013,146**
50.01 Train control and signals	$99,483,668	$2,474,099	$13,843,743	$85,699,716	$99,543,459
50.01 Allocated Contingency	$0	$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	$72,686,729	$1,053,144	$22,711,667	$62,260,382	$84,972,048
50.03 Allocated Contingency	$28,048,952	$0	$0	$28,048,952	$28,048,952
50.04 Traction power distribution: catenary and third rail	$273,992,129	$4,136,663	$54,679,833	$225,958,322	$280,638,154
50.04 Allocated Contingency	$14,338,381	$0	$0	$3,227,328	$3,227,328
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**	**$125,404**	**$18,245,197**	**$17,429,887**	**$35,675,084**
60.01 Purchase or lease of real estate	$25,927,074	$125,404	$18,116,623	$7,810,451	$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	$0	$128,574	$871,426	$1,000,000
70 - VEHICLES (96)	**$625,755,807**	**$5,318,097**	**$151,129,353**	**$474,626,453**	**$625,755,807**
70.03 Commuter Rail	$591,407,563	$5,318,097	$150,638,104	$444,375,459	$595,013,563
70.03 Allocated Contingency	$7,444,312	$0	$0	$3,838,312	$3,838,312
70.06 Non-revenue vehicles	$8,140,000	$0	$491,250	$7,648,750	$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)	**$329,704,410**	**$4,168,266**	**$276,578,155**	**$58,370,640**	**$334,948,795**
80.01 Project Development	$130,350	$0	$280,180	($149,830)	$130,350
80.02 Engineering (not applicable to Small Starts)	$186,805,254	$2,106,353	$193,873,925	($2,074,096)	$191,799,828
80.02 Allocated Contingency	$299,308	$0	$0	$549,119	$549,119
80.03 Project Management for Design and Construction	$72,987,401	$1,675,475	$63,070,649	$9,916,752	$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	$26,143	$11,245,134	$19,010,400	$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	$0	$3,558,530	$747,238	$4,305,769
80.06 Legal; Permits; Review Fees by other agencies, cities, etc.	$6,341,599	$360,295	$4,523,236	$1,818,363	$6,341,599
80.06 Allocated Contingency	$556,000	$0	$0	$556,000	$556,000
80.07 Surveys, Testing, Investigation, Inspection	$3,367,824	$0	$26,501	$3,341,322	$3,367,824
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)	**$1,812,888,024**	**$22,531,380**	**$688,532,658**	**$1,137,791,121**	**$1,826,323,779**
90 - UNALLOCATED CONTINGENCY	**$107,884,272**	**$0**	**$0**	**$94,448,517**	**$94,448,517**
Subtotal (10 - 90)	**$1,920,772,296**	**$22,531,380**	**$688,532,658**	**$1,232,239,638**	**$1,920,772,296**
100 - FINANCE CHARGES	**$9,898,638**	**$86,176**	**$5,780,071**	**$4,118,567**	**$9,898,638**
Total Project Cost (10 - 100)	**$1,930,670,934**	**$22,617,557**	**$694,312,730**	**$1,236,358,204**	**$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]	-
12/17/2018	BBI-053-CCO-032	PS-2 Site Relocation (Design Only)	$291,446	0.84%	$32,262,956
1/17/2019	BBI-053-CCO-023	Insulated Rail Joints	$2,694,519	0.00%[2]	-
1/17/2019	BBI-053-CCO-029	CHSRA Early Pole Relocation (Design Only)	$625,000	0.00%[2,3]	-
2/5/2019	BBI-053-CCO-040A	Increase in Potholing Quantity (unit price contract bid item by 25%)	$1,662,500	4.77 %	$30,600,456

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**
3/5/2019	BBI-053-CCO-042A	TPSS-2 VTA/BART Pole Relocation (Design Only)	$110,000	0.32%[3]	$30,490,456
3/11/2019	BBI-053-CCO-036	Field Order for Signal Cable Relocation (FO-064)	$86,538	0.25%	$30,403,918
3/20/2019	BBI-053-CCO-035	Millbrae Avenue Existing Overhead Barrier	($40,000)	(0.11)%	$30,443,918
3/19/2019	BBI-053-CCO-046	Training in Design Software and Potholing	$136,611	0.39%	$30,307,307
4/8/2019	BBI-053-CCO-041	Grade Crossing Warning System (CN59) – 5 mph Speed Check	$446,982	1.28%	$29,860,325
5/30/2019	BBI-053-CCO-044	Additional Daytime Potholing (Increase Quantity by 500 in Segment 4)	$150,000	0.43 %	$29,710,325
6/6/2019	BBI-053-CCO-048	Power Metering Devices	$101,908	0.29 %	$29,608,417
6/13/2019	BBI-053-CCO-045	Incentive Payment for 2018	$1,025,000	0.00%[2]	-
6/13/2019	BBI-053-CCO-024B	PG&E Utility Feed Connection to TPS #1 and TPS#2 (Material On Hand)	$1,600,000	4.59 %	$28,008,417
6/24/2019	BBI-053-CCO-043	PS-5 Site Relocation (Design Only)	$348,000	1.00 %	$27,660,417
7/1/2019	BBI-053-CCO-040B	Increase Quantity for Utilities Potholing (Bid Item #9)	$1,867,700	5.36 %	$25,792,717
7/10/2019	BBI-053-CCO-033A	Relocation of PS3 (Design) - CNPA	$500,000	1.44 %[3]	$25,292,717
		Total	**$26,989,997**	**27.38 %**	**$25,292,717**

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.
3. Third party improvements/CNPA projects that are funded with non-PCEP funds.

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
12/14/2018	STA-056-CCO-014	PTC System Change	$0	$0.00%	-

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
12/22/2018	STA-056-CCO-015	EMU Option Cars	$172,800,047	0.00%[2,3]	-
6/26/2019	STA-056-CCO-016	Testing at TTCI (Pueblo Facility) - First Trainset	$3,106,428	11.28 %	$25,035,535
		Total	**$175,799,485**	**9.11 %**	**$25,035,535**

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.
3. Third party improvements/CNPA projects that are funded with non-PCEP funds.

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[1]) **10% x $55,077,777 = $5,507,778**

Date	Change Number	Description	CCO Amount	Change Order Authority Usage[2]	Remaining Authority
3/27/2019	PROV-070-CCO-003	Track Access Delay	$25,350	0.46 %	$5,482,428
3/27/2019	PROV-070-CCO-004	Additional OCS Potholing Due to Conflict with Existing Utilities	$70,935	1.29 %	$5,411,493
3/27/2019	PROV-070-CCO-005	Install Tie Backs and Piles in Boulders at Tunnel 4	$29,478	0.54 %	$5,382,015
3/28/2019	PROV-070-CCO-001	Partnering Meetings (50% PCEP)	$14,443	0.26 %	$5,367,572
4/25/2019	PROV-070-CCO-002	Furnish Galvanized E-clips	$37,239	0.68 %	$5,330,333
4/30/2019	PROV-070-CCO-006	Additional Rock Bolts and Testing	$22,549	0.41 %	$5,307,784
5/23/2019	PROV-070-CCO-013	Late Removal of Leaky Feeder Tunnel 4 (T-4)	$21,225	0.39 %	$5,286,559
5/28/2019	PROV-070-CCO-014	OCS Piles Utility Conflict at Tunnel-1 South (T-1S)	$16,275	0.30 %	$5,270,284
5/29/2019	PROV-070-CCO-012	OCS Piles Utility Conflict at T-4S	$6,871	0.12 %	$5,263,413
5/31/2019	PROV-070-CCO-016A	Portal Structure Detailing Changes	$84,331	1.53 %	$5,179,082
6/18/2019	PROV-070-CCO-009	Creosote Ties Covering (CNPA - Drainage $3,116.00)	$3,116	0.06 %	$5,175,966
6/28/2019	PROV-070-CCO-008	Micropiles at South Tunnel-2 South (T-2S)	$41,322	0.75 %	$5,134,644
6/28/2019	PROV-070-CCO-010	Salvage Transition Panels (CNPA - Drainage $6,144.00)	$6,144	0.11 %[4]	$5,128,500
6/28/2019	PROV-070-CCO-011	Demo PVC and Plug Tunnel-1 South (T-1S) (CNPA - Drainage $4,035.00)	$4,035	0.07 %[4]	$5,124,465

6/28/2019	PROV-070-CCO-020	Unidentified SD Conflict with Junction Inlet (CNPA - Drainage $1,976.00)	$1,976	0.04 %[4]	$5,122,489
		Total	**$385,289**	**7.00 %**	**$5,122,489**

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.

CEMOF Modifications Contract

Change Order Authority (10% of ProVen Contract) **10% x $6,550,777 = $655,078**

Date	Change Number	Description	CCO Amount	Change Order Authority Usage[1]	Remaining Authority
	None to date				
		Total	**$0**	**0.00%**	**$655,078**

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.

Appendix F – Risk Table

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Listing of PCEP Risks and Effects in Order of Severity

ID	RISK DESCRIPTION	EFFECT(S)
314	Design and construction of grade crossing modifications that meets stakeholder and regulatory requirements may cost more than was budgeted and delay the revenue service date.	Delay and additional cost for rework.
313	Contractor sequencing of early utility location, preliminary design, and foundation construction may result in inefficiencies in construction, redesign, and reduced production rates.	Delay and additional cost for rework.
303	Extent of differing site conditions and delays in resolving differing site conditions delays completion of electrification increases program costs.	More differing site conditions and longer to resolve. Extends construction of foundations and the OCS system and results in less efficient construction of foundations.
242	Track access does not comply with contract-stipulated work windows.	Contractor claims for delays, schedule delays and associated costs to owner's representative staff.
223	Major program elements may not be successfully integrated with existing operations and infrastructure in advance of revenue service.	Proposed changes resulting from electrification may not be fully and properly integrated into existing system. Rework resulting in cost increases and schedule delays
257	Potential that modifications to the PTC database and signal software are not completed in time for cutover and testing.	Failure to follow the Configuration Management process will result in delays to completing PCEP signal cutovers. This could delay milestone completion as well as project substantial completion.
267	Additional property acquisition is necessitated by change in design.	New project costs and delays to schedule.
308	Rejection of DVR for ATF and static wires results in cost and schedule impacts to PCEP.	Delay and delay claims

ID	RISK DESCRIPTION	EFFECT(S)
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 data files 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.
309	Potential that vehicles will not receive timely notification from FRA of compliance with acceptable alternate crash management standards	Delays to completion of construction and additional cost to changes in design.
209	TASI may not have sufficient number of signal maintainers for testing.	• Delays to construction/testing. • Delays to completion of infrastructure may delay acceptance of vehicles
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.
14	Contractor's proposal on stakeholder requested changes to the vehicles (e.g., High Level Doors in lieu of windows as emergency exits) may significantly exceed JPB authorized amount.	Schedule delay. Cost increase.
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
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.

ID	RISK DESCRIPTION	EFFECT(S)
304	Solution to FRA concerns over bike storage impeding path to emergency exit windows path results in increased costs and potential rework.	Protracted negotiations with FRA to achieve original design
307	Potential for Stadler's sub-suppliers to fall behind schedule	Late delivery of vehicles, which could delay testing of the electrification system, commissioning of the vehicles, and RSD.
312	Project executed the OCS Option; increase in procurement durations for necessary OCS Parts (Conductor Rail) has led to an associated increase in costs and schedule duration for the overall project	Additional cost to project, primarily from additional bus bridges.
315	Increased oversight and schedule risk associated with Stadler plan to move carshell manufacturing to a new Switzerland facility	Increased PCEP oversight costs possible trainset delivery schedule slippage
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, and 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.
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.
277	Inadequate D-B labor to support multiple work segments	Additional cost and time
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

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. • Conflicts at OCS Foundation Locations led to delay in redesign and procurement of OCS Termination Structures. Since the installation of structures requires weekend shutdown conditions, the upcoming work will be more complex and congested. • Revised plan for reconstruction of South Tunnel 4 Portal requires weekend shutdowns, adding further to the complexity and congestion of work to be done during weekend shutdown conditions. • Procurement for long-lead OCS Option materials could impact ability to complete work as planned.	Delays to completion of construction and associated claims costs.
296	BBII needs to complete interconnection and traction power substations be sufficiently complete to accept interim power	Delay in testing and increased costs
13	Vehicle manufacturer could default.	Prolonged delay to resolve issues (up to 12 months) Increase in legal expenses Potential price increase to resolve contract issue
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.
56	Lack of operations personnel for testing.	• 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.

ID	RISK DESCRIPTION	EFFECT(S)
161	Unanticipated costs to provide alternate service (bus bridges, etc.) during rail service disruptions.	Cost increase.
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
247	Timely resolution of 3rd party design review comments to achieve timely approvals	Delay to completion of design and associated additional labor costs.
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.
241	Segment 4 substantially complete (Segment 4, TPS-2, Interconnect) may not be installed prior to scheduled exercising of EMUs	Inability to exercise EMUs
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.

ID	RISK DESCRIPTION	EFFECT(S)
11	Risks in achieving acceptable vehicle operations performance: <> software problems <> electrical system problems <> mechanical problems <> systems integration problems Increased issues lately with vehicles regarding system integration and compatibility.	Cost increase. Delays vehicle acceptance Potential spill-over to other program elements
16	Inter-operability issues with diesel equipment.	Cost increase.
31	New cars possibly not reliable enough to be put into service as scheduled	Operating plan negatively impacted
78	Need for unanticipated, additional ROW for new signal enclosures.	Delay while procuring ROW and additional ROW costs.
171	Electrification facilities could be damaged during testing.	Delay in commencing electrified operations.
190	Track roughness and cant could present problems for European vehicles which are accustomed to a higher class of track bed maintenance. Becomes problematic with concept of specifying "off-the-shelf" design.	Vehicle cost increase. Vehicle delivery delay.
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
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.
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

ID	RISK DESCRIPTION	EFFECT(S)
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.
311	Although project recordable injuries remain below the industry average, there have been numerous small impact incidents occurring that could potentially lead to a more serious event occurring.	The occurrence of a high impact safety event could result in project rework, construction delays, and increased project 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.
21	EMU production delay. Possible that there are quality issues, failed factory tests, poor integration / control of suppliers.	Schedule Increase - up to 6 months (6 months float already built into 36 month schedule)
27	Vehicle power consumption may not meet requirements. <>System impact study and load flow show no issues	Issue with PG&E. Can't run full acceleration.
42	Full complement of EMUs not available upon initiation of electrified revenue service	Late delivery impacts revenue service date.
55	Failure to pass Qualification Testing.	Cost Increase - minimal Schedule delay
61	Latent defects in EMU vehicles.	Unbudgeted costs incurred from legal actions. Repairs take trains out-of-service.

ID	RISK DESCRIPTION	EFFECT(S)
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.
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.
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.
8	Requests for change orders after vehicles are in production	Delays to manufacturing of vehicles and additional design and manufacturing costs.
23	Manufacturer cannot control vehicle weight to meet specifications.	Increased operating cost.
25	Potential that vehicles cannot meet requirements for "Mean Time to Repair" (MTTR).	Increased maintenance cost.
32	Failure to come up to speed on stakeholder safety requirements: <> FTA <> FRA <> CPUC	Takes longer than expected to gain FRA/FTA concurrence on waiver and/or level boarding requirements.
51	Damage during delivery of first six EMUs.	Schedule delay
53	Failure to meet Buy America requirements. (Contractor definition of component v. sub-component may not be accepted by Caltrain / FTA.)	Potential need for negotiations that might lead to delay of project award. (BA is not negotiable)
54	Infrastructure not ready for vehicles (OCS, TPS, Commissioning site / facility).	Increases cost if done off property

ID	RISK DESCRIPTION	EFFECT(S)
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.
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.
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)
192	Environmental compliance during construction. - Potential impact to advancing construction within the vicinity of any cultural finds that are excavated. - 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.
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.
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.
266	Verizon poles in conflict with OCS may not be removed in advance of OCS installation.	Delay in progress of catenary installation resulting in claims and schedule delay
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 drawings and existing infrastructure to be used as basis of final design and construction is not correct	Additional cleanup of as-builts after PCEP construction

ID	RISK DESCRIPTION	EFFECT(S)
275	DB fails to verify as-built drawings 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
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.

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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 was submitted for Segments 1 and 3 and has been approved by the wildlife agencies. The plan will be implemented prior to initiation of construction activities in those portions of segments 1 and 3 that require wildlife exclusion fencing.
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 commenced in 2018. Prior to construction activities in Segment 4, pre-construction surveys of the potential habitat areas occurred 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. No Burrowing Owls were observed during the 2018 surveys. Protocol surveys for Western Burrowing Owl were initiated once again in March 2019 in Segment 4, and were completed during this reporting period. (a total of four surveys occurring at each habitat location during the survey effort, in accordance with CDFW protocol). No Burrowing Owls were observed during the surveys that occurred during this reporting period. No Burrowing Owls 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-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. Nesting bird surveys were initiated once again on February 1st, 2019, and continued during this reporting period. No new active nests were observed during this reporting period. One previously identified nest (hummingbird) was determined to be inactive during this reporting period, and the no-disturbance buffer was subsequently removed. As of the end of the reporting period, there are no active nests.
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.

Mitigation Monitoring and Reporting

Mitigation Measure	Mitigation Timing				Status	Status Notes
	Pre-Construction	Construction	Post-Construction	Operation		
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.
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 regular 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.

Mitigation Monitoring and Reporting

Mitigation Measure	Mitigation Timing				Status	Status Notes
	Pre-Construction	Construction	Post-Construction	Operation		
CUL-1b: Minimize impacts on historic decorative tunnel material.	X				Upcoming	To be implemented prior to construction in tunnels. Historic American Engineering Record (HAER) documentation was completed in October 2018, pursuant to this measure.
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.