**Modernization Program**
**Peninsula Corridor Electrification Project (PCEP)**


# March 2019
# Monthly Progress Report

**March 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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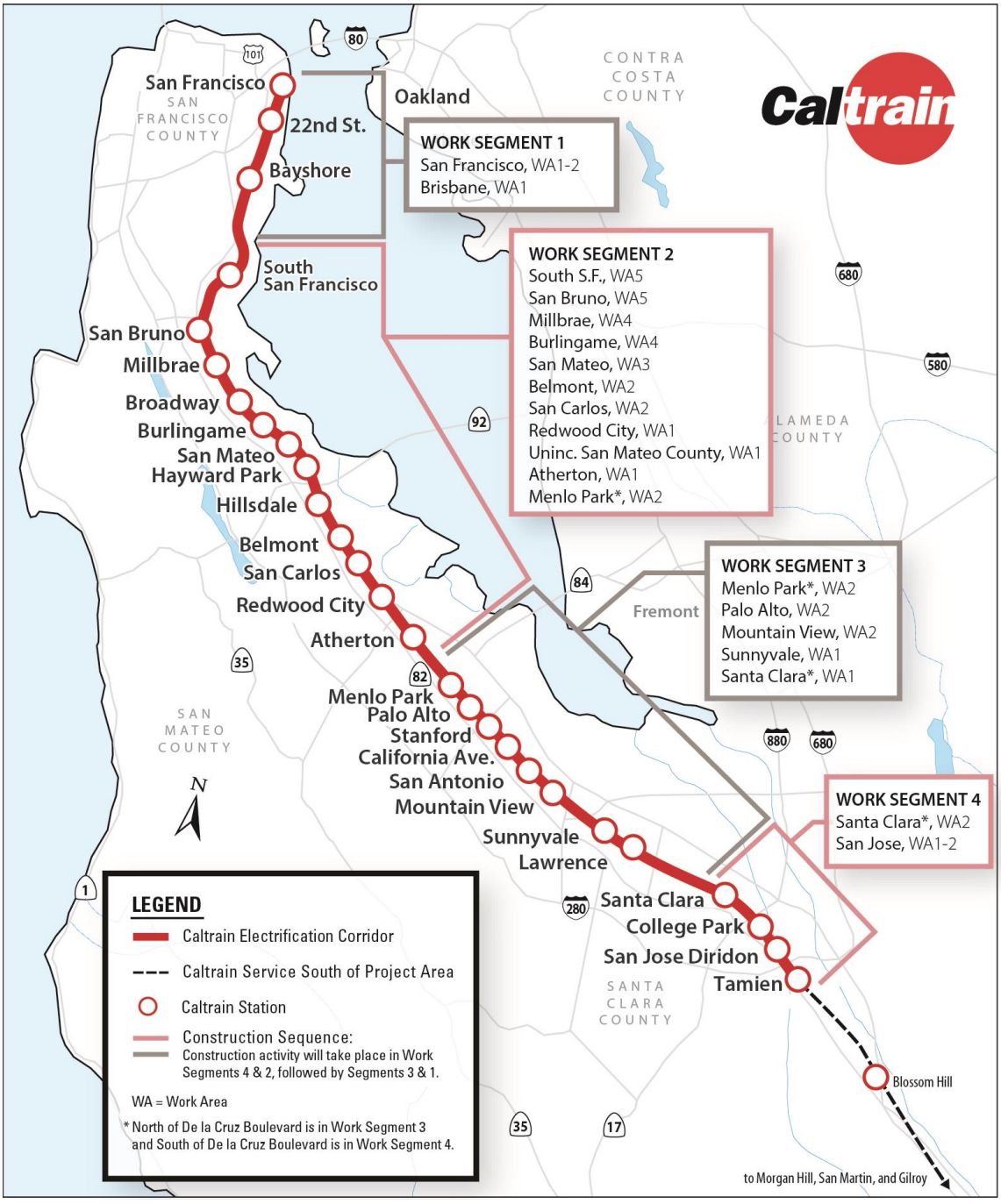
## 2.0 EXECUTIVE SUMMARY

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 in March included the installation of foundations in Segment 4, and the installation of OCS poles, cantilever arms, insulators, brackets, and balance weights in Segment 2. Signal ductbank installation continued in Segments 4 and 2 and at Traction Power Substation (TPS) 2. The signal house was installed at Control Point (CP) Mack, and Wayside Power Cubicles (WPC) were installed and set up in Segment 4.

Caltrain again returned to revenue service without incident following the 25th weekend shutdown for Tunnel Modification activity. In March the final 6 of 36 OCS foundations were installed for the Tunnel project bringing.

EMU Final Design Reviews are complete for 14 of the 17 major systems. First Article Inspections are progressing with 40 of the 69 conducted and 15 closed.

## 2.1. Funding Partners Participation in PCEP

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

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

### Electrification – Engineering Meeting – Weekly

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

Activity this Month

Funding Partners: CHSRA: Ian Ferrier

Continued discussions on resolution of outstanding issues for the Design-Build (DB) contract such as grade crossing designs, including preparation for meeting with key stakeholders such as the Federal Railroad Administration (FRA), potholing status, and foundation installation sequencing, review of key actions from weekly Balfour Beatty progress meetings, the progression of the PG&E interconnections design and substations improvement status, including interface with VTA on the design of TPS-2 interconnection into PG&E's FMC Substation, key interface points (foundation installation, signal design, etc.) between the PCEP and other major Peninsula Corridor Joint Powers Board (JPB) projects such as South San Francisco Station Project and 25th Avenue Grade Separation, the utility relocation status, status of the Tunnel Modification construction and key project issues, updates of the SCADA project, updates on DB and program schedule, including key foundation and traction power facility milestones, updates on PG&E Infrastructure buildout and power quality study, upcoming changes to

the contract in preparation for the Change Management Board (CMB), specific contract change orders that require technical review and input, and coordination with key third parties on design review and permitting for the project.

**PCEP Delivery Coordination Meeting – Bi-Weekly**

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

Activity this Month

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

The Federal Transit Administration (FTA) Quarterly Update was scheduled for April 17, but has now been postponed due to scheduling conflicts. The Safety Campaign information has been posted on social media and the video was sent out at the end of March. The agreement has been signed for the CEMOF Modifications and the Limited Notice to Proceed (LNTP) will follow. The OCS Safety Presentation was given to the San Jose Fire Chiefs on March 28. The shipment of the AEM-7 test locomotive units has changed to late May. The 60% TPS-2 design has been received and is under review. Potholing to support foundation installation continues in all segments, and Segment 4A will be starting on April 1. The next transformers delivery has been delayed until April, and the three following transformers are scheduled to be delivered in May. Twenty-four weekend shutdowns have occurred through March 26 and trains were successfully brought back into service without impact to revenue service after Weekend #23 and #24 track replacement work. Thirty of 34 OCS foundations have been installed as of the end of Weekend #24. Tunnel 1 North portal remains and is dependent upon the feeder coax relocation to occur between Weekends #24 and #25. In Tunnel 2, Drill Tech Drilling & Shoring (DTDS) replaced the OCS expansion anchors with cored/grouted anchors, and the replacements have passed testing. Tunnel 3 work is complete except for clean-up of any debris on the ballast.

**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 and 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 25$^{th}$ 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 Systems Integration test plan has been resubmitted as Revision 2 and review of this submittal is continuing.

**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; VTA: Manola Gonzalez-Estay

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

One risk was identified and one retired. One risk was moved 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 March 27th CMB meeting was rescheduled for April 3rd.

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

No changes were identified for consideration.

CEMOF Contract

No changes were identified for consideration.

Stadler Contract

No changes were identified for consideration.

SCADA Contract

No changes were identified for consideration.

Tunnel Modification Contract

No changes were identified for consideration.

## 2.2. 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.

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

**Table 2-1 Schedule Status**

| Milestones | Program Plan | Progress Schedule (March 2019)[1] |
|---|---|---|
| Segment 4 Completion to Begin Vehicle Testing | 11/21/2019 | 04/08/2020[2] |
| Arrival of First Vehicle in Pueblo, CO | N/A | Fall 2019[3] |
| Arrival of First Vehicle at JPB | 07/29/2019 | Spring 2020[3] |
| PG&E Provides Permanent Power | 09/09/2021 | 09/09/2021 |
| Electrification Substantial Completion | 08/10/2020 | 09/24/2021[2] |
| Start Phased Revenue Service | N/A | 09/27/2021 |
| RSD (w/o Risk Contingency) | 12/09/2021 | 05/06/2022[3] |
| FFGA RSD (w/ Risk Contingency) | 08/22/2022 | 08/22/2022[3] |

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.
3. Changes caused by the purchase of additional 37 traincars and offsite EMU testing have necessitated a reevaluation of the program schedule. This effort is currently in process.

## 2.3. Budget

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

**Table 2-2 Budget and Expenditure Status**

| Description of Work | Budget (A) | Current Budget (B)[1] | Cost This Month (C)[2] | Cost To Date (D)[3] | Estimate To Complete (E) | Estimate At Completion (F) = (D) + (E) |
|---|---|---|---|---|---|---|
| Electrification Subtotal | $1,316,125,208 | $1,316,125,208 | $16,270,948 | $516,754,077 | $799,371,131 | $1,316,125,208 |
| EMU Subtotal | $664,127,325 | $664,127,325 | $924,089 | $149,602,025 | $514,525,299 | $664,127,325 |
| **PCEP TOTAL** | $1,980,252,533 | $1,980,252,533 | $17,195,037 | $666,356,103 | $1,313,896,430 | $1,980,252,533 |

Notes regarding tables above:

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

## 2.4. Board Actions

- March
  - Apply for and receive $1.75 million in California Low Carbon Transportation Operations Program funding

**Future anticipated board actions include:**

- April
  - Award of Construction Management Support Services
- May
  - Shunt wire construction
  - Consultant contract amendments
- June
  - PG&E interconnect construction

## 2.5. Government and Community Affairs

There were four outreach events this month.

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

### Activity This Month

- Installed OCS foundations in Segment 4.
- Continued fabrication of OCS cantilevers and brackets in the Contractor's South San Francisco warehouse.
- Continued to install OCS poles, cantilever arms, insulators, brackets, down guys, and balance weights in Segment 2.
- Installed disconnect switches at Control Point (CP) Trousdale in Segment 2.
- Potholed at proposed OCS locations and utility locations in Segments 1, 2, 3, and 4 in advance of foundation installation. BBII and PCEP also continued to resolve conflicts found during the potholing process, such as loose concrete, asphalt, and other debris, and 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.
- Continue to install ground grid, wet utility work, and PG&E ductbank at TPS-2.
- Continued to remove and relocate utilities, install ductbanks, perform site grading at TPS-1.
- Continued to install ductbank and foundations at PS-7.
- Continued to install ductbank and foundations and perform site grading at SWS-1.
- Continued to install foundations and ductbank at PS-4.
- Began site preparation at PS-6.
- Continued to install signal ductbank in Segment 4 and 2 at CP Mack, CP Michael, CP Center, Luther Junction, and CP Trousdale.
- Installed CP Mack signal house.
- Installed and setup Wayside Power Cabinet (WPC) 27 and 28.
- Continued to installed impedance bonds in Segments 1, 2, 3 and 4.
- Continued tree pruning and removals in Segment 2 and 3.

- 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.
- Met with FRA Headquarters to continue discussion on grade crossing design concept and also met with the CPUC to present the same design concept.
- Received and reviewed 60% TPS Interconnection Plans for TPS-1 and TPS-2. The interconnection is between the PG&E substations and future Caltrain main substations.
- Received and reviewed Design Change Notice (DCN) Bridge Screening and OCS Attachments Segment 2 and 4.
- Reviewed 95% Stations and Structure Bonding S1 and S3.
- Worked with BBII through Site Specific Work Plans (SSWP) for upcoming field work.
- Continued to work with PG&E for the finalization of protection scheme studies.

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[b] | Completed this Month | Completed to Date |
| 1 | Tunnels | 34 | 6 | 34 | 31 | 0 | 0 |
| 2 | 5 | 242 | 0 | 184 | 186 | 0 | 160 |
| | 4 | 315 | 0 | 238 | 259 | 10 | 170 |
| | 3 | 182 | 0 | 60 | 147 | 0 | 0 |
| | 2 | 248 | 0 | 74 | 218 | 0 | 0 |
| | 1 | 206 | 0 | 78 | 155 | 0 | 0 |
| 4 | A | 251 | 18 | 23 | 181 | 0 | 0 |
| | B | 141 | 43 | 55 | 125 | 0 | 0 |
| | CEMOF | 112 | 0 | 0 | 102 | 0 | 0 |
| **Total** | | **1,731** | **67** | **746** | **1,404** | **10** | **330** |

Note:

a. Foundations required does 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.

### Activity Next Month

- Continue installation of foundations in Segment 4.
- Continue resolution of DSCs.
- Continue to install protective steel plates for protection of utilities during foundation installation.
- Continue to install poles, cantilevers, balance weights, insulators and brackets 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 continue in Segments 1, 2, 3 and 4.
- Continue construction at TPS-1 and TPS-2.
- Continue construction at PS-7, PS-4 and Switching Station. Transformer delivery for PS-7 and Switching Station has been pushed back to May.
- Continue to install conduit and foundations for signal and WPC units in Segment 2 and 4.
- Continue to install impedance bonds.
- Continue to coordinate with stakeholders on the Consistent Warning Time solution and advance location specific design.
- Continue to progress locations specific design for grade crossing system.
- Review BBII work plans for upcoming construction activities.
- 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, 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 the implementation of clearance, remote power terminal, and other feature development.
- Began to modify the database based on the Points List.
- Completed development and testing of the communications interface
- Completed development of Sequence of Events.
- Continued development of Field Power Director.

### Activity Next Month

- Prepare and deliver the Monthly Report and the Monthly Schedule Update.
- Attend project status meetings.
- Support ongoing discussions concerning Requests for Information.
- Continue to modify the database reflecting design drawings from the Points List.

- Continue the implementation of Clearance and Remote Power Terminal.
- Continue unit tests as feature development is completed. Tests planned include:
  - Power Director Shift Change
  - Sequence of Events
  - San Jose lab point-to-point test
- Delivery of test procedures (as these unit tests are completed).

## 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

- Successfully returned Caltrain to revenue service after 25 total weekend shutdowns through March 2019.
- Tunnel 1: Track replacement work completed. Final surfacing completed from 16th Street through South Tunnel 1. Replacement of sump pumps within the tunnel was performed.
- Tunnel 2: Survey for surfacing of final track alignment performed.
- Tunnel 3: Work completed except for OCS Termination Structure installation at portals and cleanup of any debris within tunnel.
- Tunnel 4: Track replacement work completed. Rail was installed as bolted rail prior to destressing and welding. Replacement and installation of sump pumps and gutter curbs occurred in the tunnel.
- The last six of 34 total foundations were installed in March 2019.
- Continued coordination of weekly plans for field work activities.

### Activity Next Month

- Continue track final surfacing work, destressing and welding of track, and drainage activities near and within Tunnels 1 and 4.
- Begin Historic Tunnel 4 South Portal reconstruction pending FTA/State Historic Preservation Officer approval of revised plan due to poor condition of existing archstones.
- Begin fabrication of OCS Termination Structures from Steel Shop Drawings based on as-built survey of foundations and shop drawing approval.
- Review submittals and SSWPs.
- Continue weekly coordination for field activities and associated TASI Protection.

# 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 Cars funded by a Transit and Intercity Rail Capital Program (TIRCP) grant.

### Activity This Month

- Final Design Reviews complete for 14 of the 17 major systems. Remaining three are conditionally approved.
- First Article Inspections (FAIs) continue; 69 total, 40 conducted, 15 closed.
- Engineer's seat pedestal successfully retested for crashworthiness.
- Trainset 1: all seven shells in Stadler's Salt Lake City facility undergoing assembly.
- Trainset 2: 3 carshells in SLC, others in transit from Europe.
- Trainset 3: shells being fabricated in Altenrhein for shipment in March and April 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 | 3 | 0 | 0 |
| Trainset | 3 | 1 | 0 | 0 | 0 |
| Trainset | 4 | 0 | 0 | 0 | 0 |
| Trainset | 5 | 0 | 0 | 0 | 0 |
| Trainset | 19 | 0 | 0 | 0 | 0 |
| **TOTAL** | | **15/133** | **10/133** | **0/133** | **0/133** |

- Caltrain and FRA representatives continue to work toward FRA compliance. Base waiver granted to Caltrain this report period.

### Activity Next Month

- Pursue change order to perform Trainset Level Design Conformance Testing at Pueblo, Colorado test facility.
- Continue truck (bogie) structural and lifecycle testing.
- Continue passenger side door endurance testing.

- Repeat passenger table crash test.
- Conduct last of the four floor/ceiling fire endurance tests.
- Meet with FRA and Volpe Center to present alternate vehicle technology upcoming submittal.

## 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

- Progressed ancillary procurements for pantograph CCTV-based monitoring system and scissor platform lifts.

### Activity Next Month

- Finalize specifications and obtain approval for Scissor Lift Work Platform.
- Revise and obtain approval of Automatic Pantograph Inspection System.

## 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

- Provided OCS safety awareness presentations to the Santa Clara County Fire Department Chiefs.
- 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 Capital Projects Safety Committee meeting.
- 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.
- Continued to provide safety oversight of the tunnel project contract work. Attended weekly project coordination meetings to discuss ongoing safety concerns and recommended improvements.

### Activity Next Month

- Monthly safety communication meetings continue to be scheduled for the Project Safety and Security Certification Committee, Fire/Life Safety Committee, and other project-related contractor and JPB safety meetings to discuss safety priorities.
- 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 TransitAmerica Services, Inc (TASI) to identify opportunities to further improve project safety performance and continue to reinforce lessons learned safety mitigation recommendations resulting from prior project incidents.
- Continue to provide safety and security oversight of the weekend shutdowns for Tunnel Project contract activities and continue to document the Tunnel Project safety and security certification requirements.

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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 two audits of BBII field activities: concrete pour at PS-4 transformer walls and pedestal, and concrete coring of the OCS foundations.
- Conducted a laboratory audit of BBII's QC Lab, ISI, of the concrete strength tests for OCS foundation cores.
- Conducted a quality systems audit and Factory Acceptance Test dry run of the CP Mack signal house manufacturer, Alstom.

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 | 4 | 89 |
| **Audit Findings** | | |
| Audit Findings Issued | 2 | 60 |
| Audit Findings Open | 2 | 2 |
| Audit Findings Closed | 0 | 58 |
| **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.

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

### 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 grade crossings as well the effect that differing site conditions (DSCs) are having on OCS foundation installation. JPB continues to work with and is urging BBII to accelerate the crossing design completion and issues relating to DSCs.

**Table 7-1 Schedule Status**

| Milestones | Program Plan | Progress Schedule (March 2019)[1] |
|---|---|---|
| Segment 4 Completion to Begin Vehicle Testing | 11/21/2019 | 04/08/2020[2] |
| Arrival of First Vehicle in Pueblo, CO | N/A | Fall 2019[3] |
| Arrival of First Vehicle at JPB | 07/29/2019 | Spring 2020[3] |
| PG&E Final Design and Construction to provide Permanent Power Complete | 09/09/2021 | 09/09/2021 |
| Electrification Substantial Completion | 08/10/2020 | 09/24/2021[2] |
| Start Phased Revenue Service | N/A | 09/27/2021 |
| RSD (w/o Risk Contingency) | 12/09/2021 | 05/06/2022[3] |
| FFGA RSD (w/ Risk Contingency) | 08/22/2022 | 08/22/2022[3] |

Note:

1. Dates may shift slightly as the update of this month's Progress Schedule is still in process.
2. See "Notable Variances" above for explanation on date shift.
3. Changes caused by the purchase of additional 37 traincars and offsite EMU testing have necessitated a reevaluation of the program schedule. This effort is currently in process.

**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[1] | 05/06/2022 | 05/06/2022[2] |
| FFGA RSD w/ Risk Contingency[1] | 08/22/2022 | 08/22/2022[2] |

Note:

1. Milestone activity.
2. Changes caused by the purchase of additional 37 traincars and EMU offsite testing have necessitated a reevaluation of the program schedule. This effort is currently in process.

## 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) |
| Arrival of 1st Trainset in Pueblo, CO | Fall 2019 |
| Segment 4 Completion to Begin Vehicle Testing | 04/08/2020 |
| Arrival of 1st Trainset at JPB | Spring 2020 |
| Conditional Acceptance of 1st Trainset | 11/27/2020 |
| System Electrified | 09/24/2021 |
| Begin Phased Revenue Service | 09/27/2021 |
| 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 | $716,689,355 | $9,767,396 | $298,053,459 | $418,635,896 | $716,689,355 |
| SCADA | $0 | $3,446,917 | $0 | $1,934,371 | $1,512,546 | $3,446,917 |
| Tunnel Modifications | $11,029,649 | $41,881,170 | $1,232,380 | $22,147,590 | $19,733,580 | $41,881,170 |
| Real Estate | $28,503,369 | $28,503,369 | $596,206 | $17,818,246 | $10,685,123 | $28,503,369 |
| Private Utilities | $63,515,298 | $94,051,380 | $898,121 | $36,392,286 | $57,659,094 | $94,051,380 |
| Management Oversight [5] | $141,506,257 | $140,822,289 | $2,484,268 | $109,933,680 | $30,888,608 | $140,822,289 |
| Executive Management | $7,452,866 | $6,214,226 | $182,239 | $6,248,065 | ($33,839) | $6,214,226 |
| Planning | $7,281,997 | $7,281,997 | $23,246 | $5,562,457 | $1,719,540 | $7,281,997 |
| Community Relations | $2,789,663 | $2,789,663 | $15,914 | $1,371,022 | $1,418,641 | $2,789,663 |
| Safety & Security | $2,421,783 | $2,421,783 | $91,515 | $2,175,790 | $245,993 | $2,421,783 |
| Project Management Services | $19,807,994 | $19,807,994 | $199,862 | $10,821,015 | $8,986,979 | $19,807,994 |
| Engineering & Construction | $11,805,793 | $11,805,793 | $186,199 | $6,535,351 | $5,270,442 | $11,805,793 |
| Electrification Eng & Mgmt | $50,461,707 | $50,461,707 | $1,347,499 | $38,026,778 | $12,434,929 | $50,461,707 |
| IT Support | $312,080 | $331,987 | $7,870 | $399,238 | ($67,251) | $331,987 |
| Operations Support | $1,445,867 | $1,980,632 | $157,140 | $2,035,693 | ($55,061) | $1,980,632 |
| General Support | $4,166,577 | $4,166,577 | $150,470 | $4,109,567 | $57,010 | $4,166,577 |
| Budget / Grants / Finance | $1,229,345 | $1,229,345 | $34,558 | $1,163,258 | $66,087 | $1,229,345 |
| Legal | $2,445,646 | $2,445,646 | $20,420 | $3,430,208 | ($984,561) | $2,445,646 |
| Other Direct Costs | $5,177,060 | $5,177,060 | $67,336 | $3,347,361 | $1,829,699 | $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 | $1,129,757 | $22,164,092 | $33,110,992 | $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 | $0 | $715,411 | $14,257,234 | $14,972,644 |
| Required Projects | $17,337,378 | $15,302,378 | $2,337 | $730,336 | $14,572,042 | $15,302,378 |
| Maintenance Training | $1,021,808 | $1,021,808 | $0 | $0 | $1,021,808 | $1,021,808 |
| Finance Charges | $5,056,838 | $5,056,838 | $160,484 | $3,306,077 | $1,750,761 | $5,056,838 |
| Contingency | $276,970,649 | $194,796,207 | $0 | $0 | $160,587,848 | $160,587,848 |
| Forecasted Costs and Changes | $0 | $0 | $0 | $0 | $34,208,359 | $34,208,359 |
| **ELECTRIFICATION SUBTOTAL** | **$1,316,125,208** | **$1,316,125,208** | **$16,270,948** | **$516,754,077** | **$799,371,131** | **$1,316,125,208** |

Notes regarding tables above:

1. "Current Budget" includes executed change orders and awarded contracts.
2. Column C "Cost This Month" represents the cost of work performed this month.
3. Column D "Cost To Date" includes actuals (amount paid) and accruals (amount of work performed) to date.
4. Cost To Date for "Electrification" includes 5% for Contractor's retention until authorization of retention release.
5. The agency labor is actual through February 2019 and accrued for March 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 | $550,792,469 | $0 | $112,698,145 | $438,094,324 | $550,792,469 |
| 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 | $757,609 | $34,539,456 | $28,840,481 | $63,379,937 |
| Executive Management | $5,022,302 | $4,263,136 | $109,182 | $3,915,228 | $347,908 | $4,263,136 |
| Community Relations | $1,685,614 | $1,685,614 | $9,754 | $526,475 | $1,159,139 | $1,685,614 |
| Safety & Security | $556,067 | $556,067 | $9,478 | $420,481 | $135,587 | $556,067 |
| Project Mgmt Services | $13,275,280 | $13,275,280 | $121,601 | $7,070,158 | $6,205,123 | $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 | $369,509 | $16,090,298 | $15,992,258 | $32,082,556 |
| IT Support | $1,027,272 | $1,027,272 | $5,064 | $465,036 | $562,236 | $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 | $60,486 | $1,795,027 | $804,520 | $2,599,547 |
| Budget / Grants / Finance | $712,123 | $712,123 | $32,152 | $715,133 | ($3,010) | $712,123 |
| Legal | $1,207,500 | $1,207,500 | $379 | $1,211,956 | ($4,456) | $1,207,500 |
| Other Direct Costs | $4,003,139 | $4,003,139 | $40,004 | $2,028,647 | $1,974,492 | $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 | $68,119 | $338,119 | $4,161,881 | $4,500,000 |
| Finance Charges | $1,941,800 | $1,941,800 | $98,361 | $2,026,305 | ($84,505) | $1,941,800 |
| Contingency | $38,562,962 | $34,222,341 | $0 | $0 | $33,286,341 | $33,286,341 |
| Forecasted Costs and Changes | $0 | $0 | $0 | $0 | $936,000 | $936,000 |
| **EMU SUBTOTAL** | **$664,127,325** | **$664,127,325** | **$924,089** | **$149,602,025** | **$514,525,299** | **$664,127,325** |

Notes regarding tables above:

1. "Current Budget" includes executed change orders and awarded contracts.
2. Column C "Cost This Month" represents the cost of work performed this month.
3. Column D "Cost To Date" includes actuals (amount paid) and accruals (amount of work performed) to date.
4. The agency labor is actual through February 2019 and accrued for March 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** | **$16,270,948** | **$516,754,077** | **$799,371,131** | **$1,316,125,208** |
| EMU Subtotal | **$664,127,325** | **$664,127,325** | **$924,089** | **$149,602,025** | **$514,525,299** | **$664,127,325** |
| **PCEP TOTAL** | **$1,980,252,533** | **$1,980,252,533** | **$17,195,037** | **$666,356,103** | **$1,313,896,430** | **$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 | $534,375 | $640,901 | $359,099 | $1,000,000 |
| PS-3 Relocation (Design) | TBD | TBD | $0 | $0 | TBD | TBD |
| TPSS-2 Pole Relocation (Design) | $110,000 | $110,000 | $0 | $0 | $110,000 | $110,000 |
| EMU Option Cars | $172,800,047 | $172,800,047 | $0 | $0 | $172,800,047 | $172,800,047 |
| **CNPA TOTAL** | **$173,910,047** | **$173,910,047** | **$534,375** | **$640,901** | **$173,269,146** | **$173,910,047** |

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

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

### Executed Contract Change Orders (CCO) This Month

#### Electrification Contract

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

| Date | Change Number | Description | CCO Amount | Change Order Authority Usage |
|---|---|---|---|---|
| 03/05/2019 | BBI-053-CCO-042A | TPS-2 VTA/BART Pole Relocation (Design Only) | $110,000 | $110,000 |
| 03/06/2019 | BBI-053-CCO-036Rev1 | Signal Cable Relocation (Field Order #64) | $86,538 | $86,538 |
| 03/21/2019 | BBI-053-CCO-035Rev1 | Millbrae Ave Existing Overhead Barrier – Credit Change Order | ($40,000) | ($40,000) |
| | | **Total** | **$156,538** | **$156,538** |

[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**

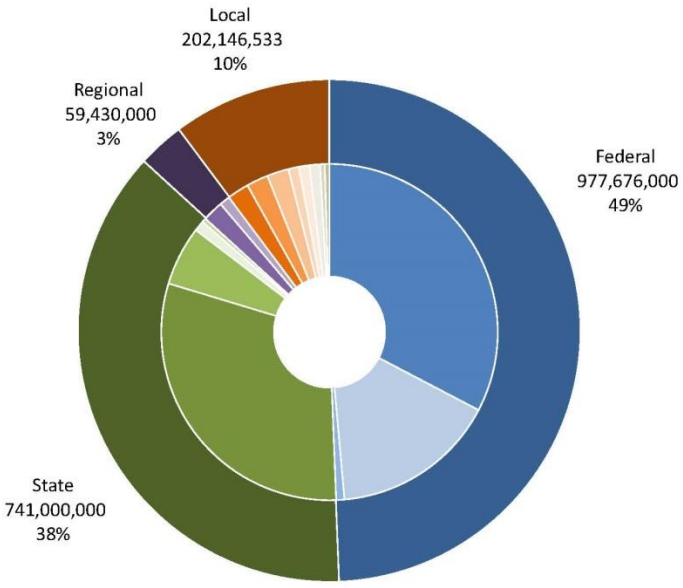
| Date | Change Number | Description | CCO Amount | Change Order Authority Usage |
|---|---|---|---|---|
| | None | | $0 | $0 |
| | | **Total** | **$0** | **$0** |

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

## 10.0 FUNDING

Figure 10-1 depicts a summary of the funding plan for the PCEP. It provides a breakdown of the funding partners as well as the allocated funds. As previously reported, the JPB was awarded over $70 million in FTA Section 5307 formula funds, which are part of MTC's $315 million commitment to the project.

**Figure 10-1 Funding Plan**




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

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

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## 11.0 RISK MANAGEMENT

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

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

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

1. Contractor sequencing of foundation construction may result in inefficiencies in construction, redesign, and reduced production rates.
2. Track access does not comply with contractor-stipulated work windows.
3. BBII may be unable to develop grade crossing modifications that meet stakeholder and regulatory requirements.
4. Late changes in vehicle specification or requirements could result in a schedule delay or increased costs.
5. There is a potential that modifications to the PTC database and signal software are not completed in time for cutover and testing.
6. Major program elements may not be successfully integrated with existing operations and infrastructure in advance of revenue service.
7. Additional property acquisition may be necessitated.
8. Rejection of Design Variance Request for autotransformer feeder and static wires may result in cost and schedule impacts to PCEP.
9. Inadequate TASI resources may delay construction activities.
10. Changes to PTC implementation schedule could delay completion of electrification work.
11. Decisions to stakeholder requested changes to the vehicles may delay RSD.

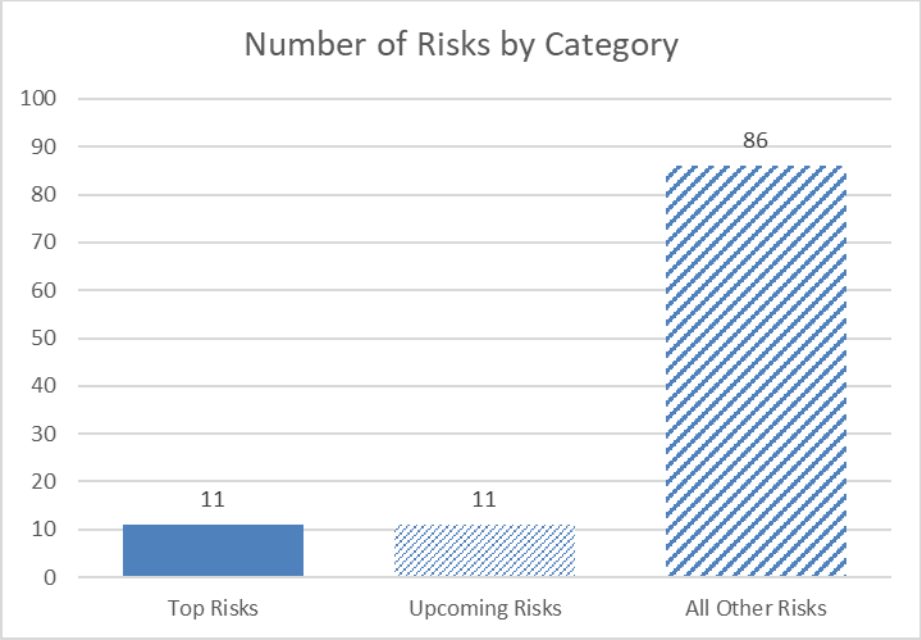
**Activity This Month**

- 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.
- Conducted monthly Risk Assessment Committee meeting.
- Reviewed Monte Carlo analysis on current risk register to establish cost of risk.
- Initiate risk review of contractor-owned risks.

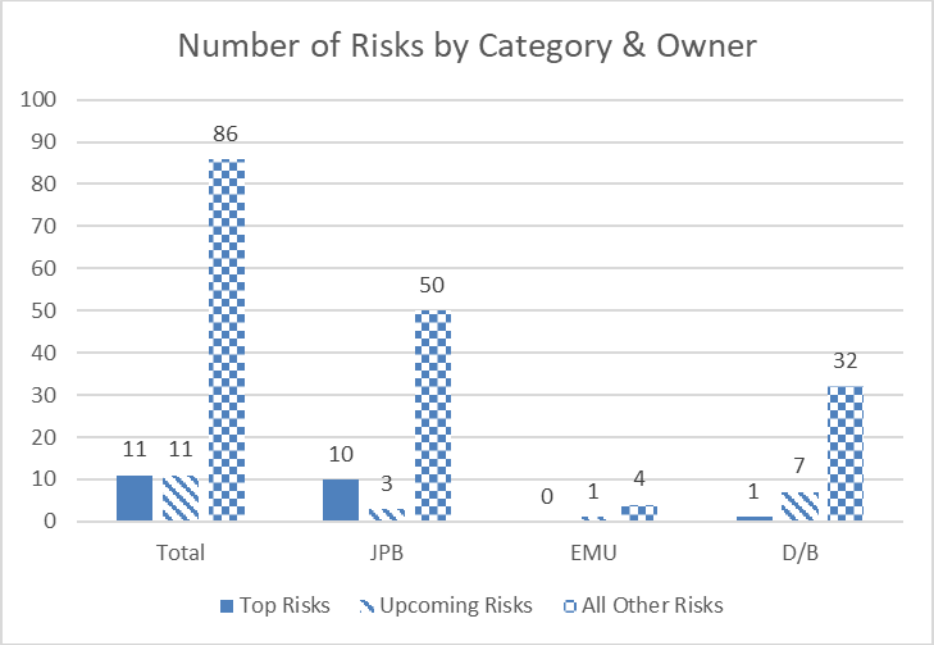
Figures 11-1 and 11-2 show the risks identified for the program. Risks are categorized as top risk, upcoming risk, and all other risks. The categories are based on a rating scale composed of schedule and cost factors. Top risks are considered to have a significantly higher than average risk grade. Upcoming 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 = 108**

**Figure 11-2 Risk Classification**




**Total Number of Active Risks = 108**

## 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.
- Coordinate with contractor on Contractor Risk Management Program.
- Conduct Risk Assessment Committee meeting.
- Complete risk analysis for cost and schedule based on updated risk register and finalize Risk Register Refresh Technical Memorandum.
- Conduct risk audit of top risks.
- Update contractor-owned risks and return to BBII for review.

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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, utility removal, ductbank installation, tree trimming/removal, staging area development, conduit installation, , pole replacement, 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 were initiated 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, pot holing for utility location, duct bank and manhole installation, tree trimming/removal, conduit installation, clearing and grubbing, grading, backfilling, pole replacement, 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 commence (nesting bird season is defined as February 1 through September 15), and protocol-level surveys for a sensitive avian species will continue for the 2019 breeding season at previously identified potential habitat locations.
- 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 early 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.
- Worked on relocation design review for PG&E and coordinated with PG&E on permitting and work planning.
- Continued to plan relocation work for Silicon Valley Power (SVP) and Palo Alto Power facilities.
- Coordinated relocation by communication cable owners such as AT&T and Comcast.
- Continued PG&E relocations in Segments 2 and 4.
- Began relocation of SVP facilities in Segment 3.
- Performed verifications for relocated PG&E facilities.
- 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 from PG&E, SVP, Palo Alto Power, and communications companies and coordinate relocation field work.
- Continue PG&E and communication relocations in Segments 2 and 4.
- Continue 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 ROW for the PCEP, but in certain locations, will need to acquire small portions of additional real estate to expand the Right of Way (ROW) to accommodate installation of OCS supports (fee acquisitions or railroad easements) and associated Electrical Safety Zones (easements). There are two larger full acquisition areas required for wayside facilitates. The PCEP Real Estate team manages the acquisition of all property rights. Caltrain does not need to acquire real estate to complete the EMU procurement portion of the PCEP.

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

- One for which the appraisal has been completed and the offer is pending.
    - BBII need date is October 2019.
- One in Segment 3 for which offer was recently made.
- One parcel in Segment 2 needed as soon as possible.
    - The site is owned by UPRR, which has agreed to issue an early entry 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 3, needed in June 2019.
    - Two parcels in Segment 4, needed in February 2019.

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

- Staff has defined a process to ensure that BBII conveys new needs 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**

- Actively negotiating with Willowbend Apartments.
- Staff reviewing potential new pole locations and providing feedback to the design team.
- Signed contract and deed with property owner.
- Worked with San Francisco Public Utilities Commission to gain early access on their property.

- Working with property owners for Segment 4 to enable potholing.
- Facilitated access to Central Concrete for potholing.
- Working with PG&E Legal to expedite early access for potholing.
- Working with UPRR on encroachment permit and/or easement.
- Worked with relocation to review claims for Loop Transportation.

**Activity Next Month**

- Continue to negotiate for all open parcels.
- Appraisal underway for a parcel in the city of Belmont.
- Continue to negotiate a settlement with Willowbend Apartments, with intention of obtaining Possession and Use Agreement.
- Commence appraisal for Diridon Hospitality.
- Continue to work with Segment 4 owners for early access to enable potholing.
- Make offers on the parcel for which appraisals have been completed.
- Actively participate in Foundation/Pothole weekly meeting.
- 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

- Sunnyvale Community Meeting
- Local Policy Makers Group
- City/County Staff Coordinating Group
- Dr. George Davis Senior Center

### Third Party/Stakeholder Actions

- 65% OCS Foundation and Pole Layouts – Brisbane
- 65% Bridge Attachments – Unincorporated Santa Clara County
- Issued for Construction Paralleling Station 4 – San Mateo
- Issued for Construction Switching Station 1 – Redwood City

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## 17.0 DISADVANTAGED BUSINESS ENTERPRISE (DBE) PARTICIPATION AND LABOR STATISTICS

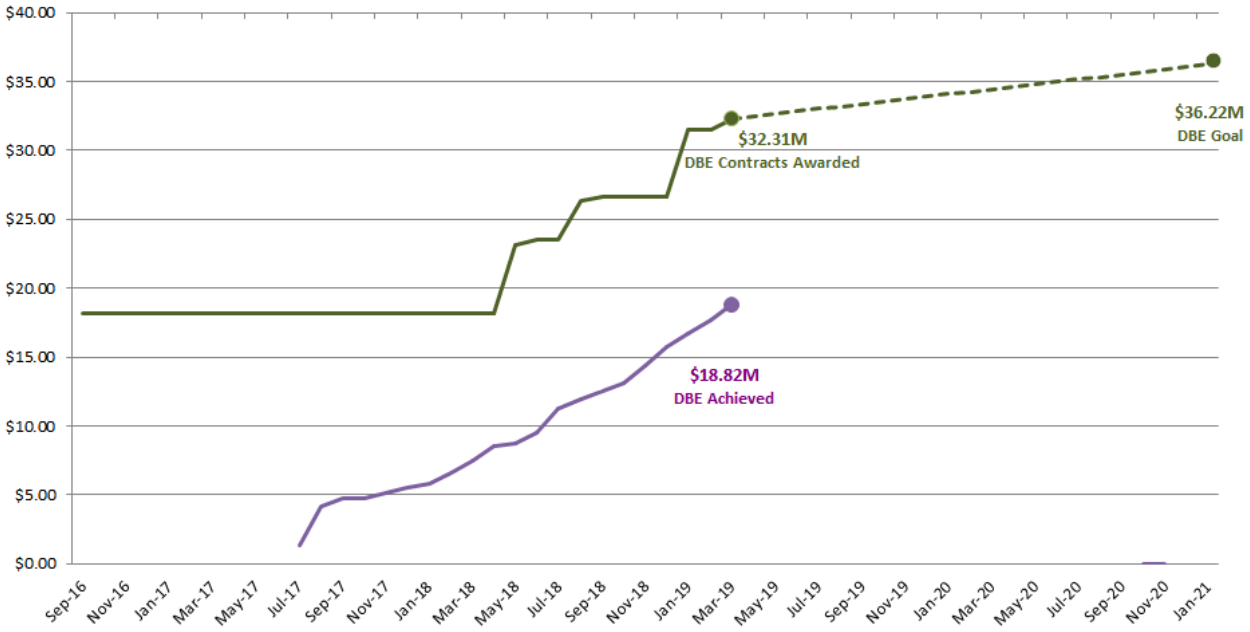
BBII proposed that 5.2% ($36,223,749) of the total DB contract value ($696,610,558) would be subcontracted to DBEs.

### Activity This Month

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

- **$18,824,329** has been paid to DBE subcontractors.
- **2.7%** 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 April 2019, we continue to anticipate increasing our DBE commitments to firms who we are currently negotiation pricing on proposed work or Professional Services Agreements. We also anticipate that the existing project work will increase resulting in expanded work for current DBE subcontractors.”

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## 18.0 PROCUREMENT

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

- None

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

- None

**Contract Awards this Month:**

- 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:**

- Contract Amendment – 14-PCJPB-P-005 (URS/AECOM) – On-Call Program Management Services for CalMod
- Contract Amendment – 14-PCJPB-P-007 (Gannett Fleming) – On-Call Electrification Support Services for CalMod

**Upcoming Contract Awards:**

- RFP – 18-J-P-115 – On-Call Construction Management Services for PCEP

**Upcoming IFB/RFQ/RFP to be Issued:**

- RFQ – Manlifts
- RFQ – Pantograph Inspection Camera and 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<br>RFI for EMU |
| 2015 | JPB approves final CEQA EIR<br>JPB approves issuance of RFP for electrification<br>JPB approves issuance of RFP for EMU<br>Receipt of proposal for electrification<br>FTA approval of Core Capacity Project Development |
| 2016 | JPB approves EIR Addendum #1: PS-7<br>FTA re-evaluation of 2009 FONSI<br>Receipt of electrification best and final offers<br>Receipt of EMU proposal<br>Application for entry to engineering to FTA<br>Completed the EMU Buy America Pre-Award Audit and Certification<br>Negotiations completed with Stadler for EMU vehicles<br>Negotiations completed with BBII, the apparent best-value electrification firm<br>JPB approves contract award (LNTP) to BBII<br>JPB approves contract award (LNTP) to Stadler<br>FTA approval of entry into engineering for the Core Capacity Program<br>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)<br>FTA FFGA executed, committing $647 million to the project (May)<br>JPB approves $1.98 billion budget for PCEP (June)<br>Issued NTP for EMUs to Stadler (June 1)<br>Issued NTP for electrification contract to BBII (June 19)<br>Construction began (August)<br>EMU manufacturing began (October)<br>Issued NTP for SCADA to Rockwell Collins (ARINC) (October)<br>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) |

# 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** |
| **SS** | **Switching Station** |
| **SSCP** | **Safety and Security Certification Plan** |
| **SSMP** | **Safety and Security Management Plan** |

| | |
|---|---|
| **SSWP** | **Site Specific Work Plan** |
| **TASI** | **Transit America Services Inc.** |
| **TBD** | **To Be Determined** |
| **TPS** | **Traction Power Substation** |
| **TVA** | **Threat and Vulnerability Assessment** |
| **UPRR** | **Union Pacific Railroad** |
| **USACE** | **United States Army Corp of Engineers** |
| **USFWS** | **U.S. Fish and Wildlife Service** |
| **VTA** | **Santa Clara Valley Transportation Authority** |

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# Appendix B – Funding Partner Meetings

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## Funding Partner Meeting Representatives

Updated August 1, 2018

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

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# Appendix C – Schedule

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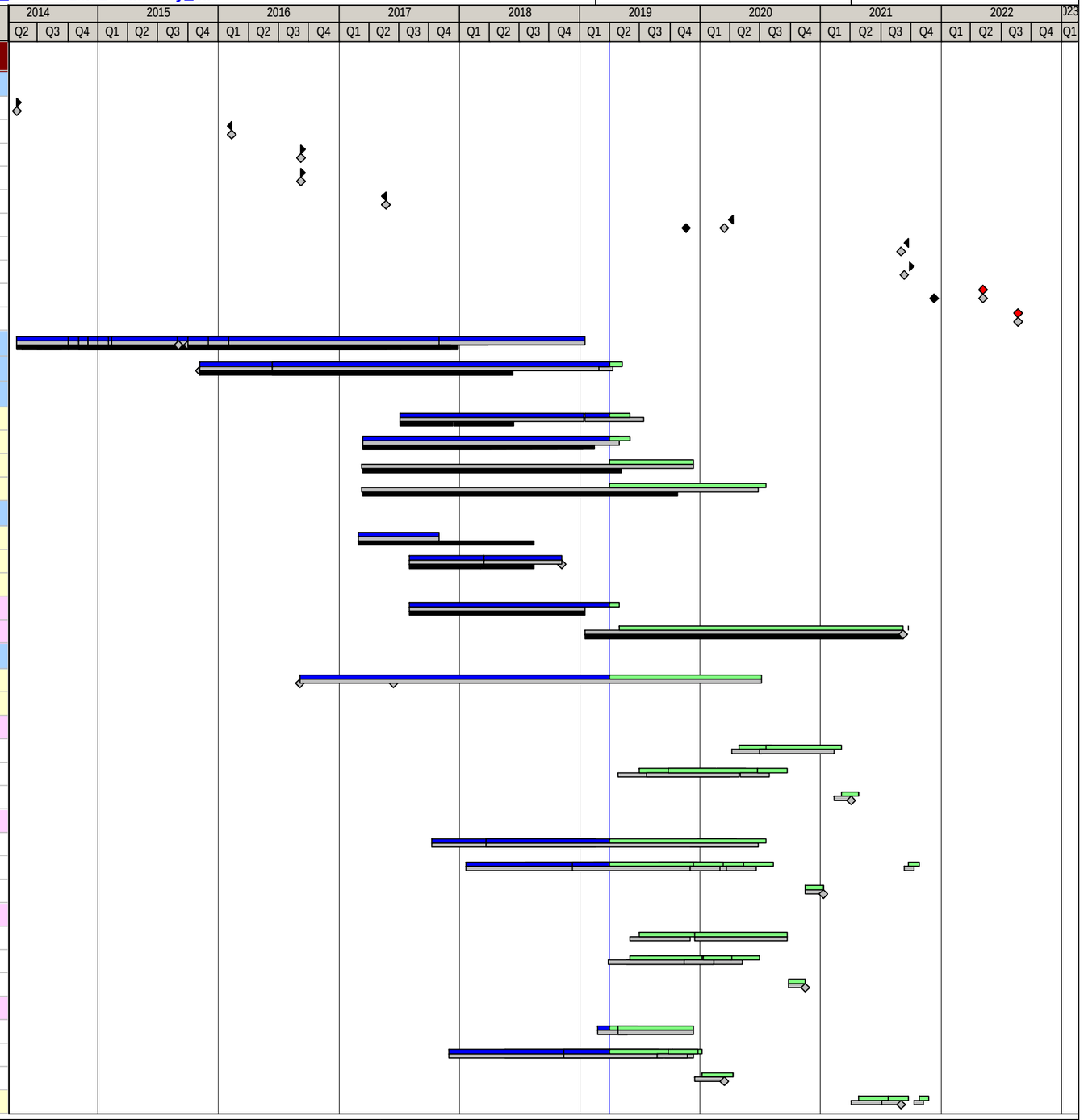
| # | Activity Name | Duration | Start | Finish |
|---|---|---|---|---|
| 1 | ***MASTER PROGRAM SCHEDULE C18.02*** | 2168d | 05-01-14 A | 08-22-22 |
| 2 | **MILESTONES** | 2168d | 05-01-14 A | 08-22-22 |
| 3 | Start | 0d | 05-01-14 A | |
| 4 | NEPA Reevaluation Complete | 0d | | 02-11-16 A |
| 5 | LNTP to Electrification Contractor | 0d | 09-06-16 A | |
| 6 | LNTP to Vehicle Manufacturer | 0d | 09-06-16 A | |
| 7 | FTA Issues FFGA | 0d | | 05-23-17 A |
| 8 | Segment 4 (incl. Test Track) Complete | 0d | | 04-08-20 |
| 9 | Electrification Substantial Completion | 0d | | 09-24-21 |
| 10 | Start Phased Revenue Service | 0d | 09-27-21 | |
| 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** | 892d | 11-05-15 A | 05-10-19 |
| 15 | **OVERHEAD UTILITY RELOCATION (Various)** | 852d | 03-10-17 A | 07-17-20 |
| 16 | **SILICON VALLEY POWER (SVP)** | 484d | 07-06-17 A | 05-31-19 |
| 17 | **PG&E** | 565d | 03-13-17 A | 05-31-19 |
| 18 | **CITY OF PALO ALTO (CoPA)** | 701d | 03-10-17 A | 12-13-19 |
| 19 | **AT&T** | 852d | 03-10-17 A | 07-17-20 |
| 20 | **PG&E INFRASTRUCTURE** | 1162d | 03-01-17 A | 09-24-21 |
| 21 | **INTERCONNECT (Feasibility Study)** | 171d | 03-01-17 A | 10-31-17 A |
| 22 | **INTERIM POWER** | 322d | 08-01-17 A | 11-05-18 A |
| 23 | **PERMANENT POWER** | 1055d | 08-01-17 A | 09-24-21 |
| 24 | ***DESIGN & PERMITTING*** | 444d | 08-01-17 A | 04-30-19 |
| 25 | ***CONSTRUCTION*** | 611d | 05-01-19 | 09-24-21 |
| 26 | **ELECTRIFICATION (BBII)** | 1362d | 09-06-16 A | 11-24-21 |
| 27 | **DESIGN** | 999d | 09-06-16 A | 07-05-20 |
| 28 | **CONSTRUCTION** | 1478d | 10-09-17 A | 10-25-21 |
| 29 | ***Segment 1*** | 666d | 07-01-19 | 04-26-21 |
| 30 | **OCS** | 310d | 04-28-20 | 03-03-21 |
| 31 | **Traction Power** | 448d | 07-01-19 | 09-20-20 |
| 32 | **Segment Testing** | 54d | 03-04-21 | 04-26-21 |
| 33 | ***Segment 2*** | 1478d | 10-09-17 A | 10-25-21 |
| 34 | **OCS** | 1015d | 10-09-17 A | 07-19-20 |
| 35 | **Traction Power** | 1376d | 01-19-18 A | 10-25-21 |
| 36 | **Segment Testing** | 54d | 11-15-20 | 01-08-21 |
| 37 | ***Segment 3*** | 532d | 06-03-19 | 11-15-20 |
| 38 | **OCS** | 449d | 07-02-19 | 09-22-20 |
| 39 | **Traction Power** | 394d | 06-03-19 | 06-30-20 |
| 40 | **Segment Testing** | 54d | 09-23-20 | 11-15-20 |
| 41 | ***Segment 4*** | 860d | 12-01-17 A | 04-08-20 |
| 42 | **OCS** | 292d | 02-25-19 A | 12-13-19 |
| 43 | **Traction Power** | 768d | 12-01-17 A | 01-07-20 |
| 44 | **Segment Testing** | 92d | 01-08-20 | 04-08-20 |
| 45 | **TESTING** | 212d | 04-26-21 | 11-24-21 |



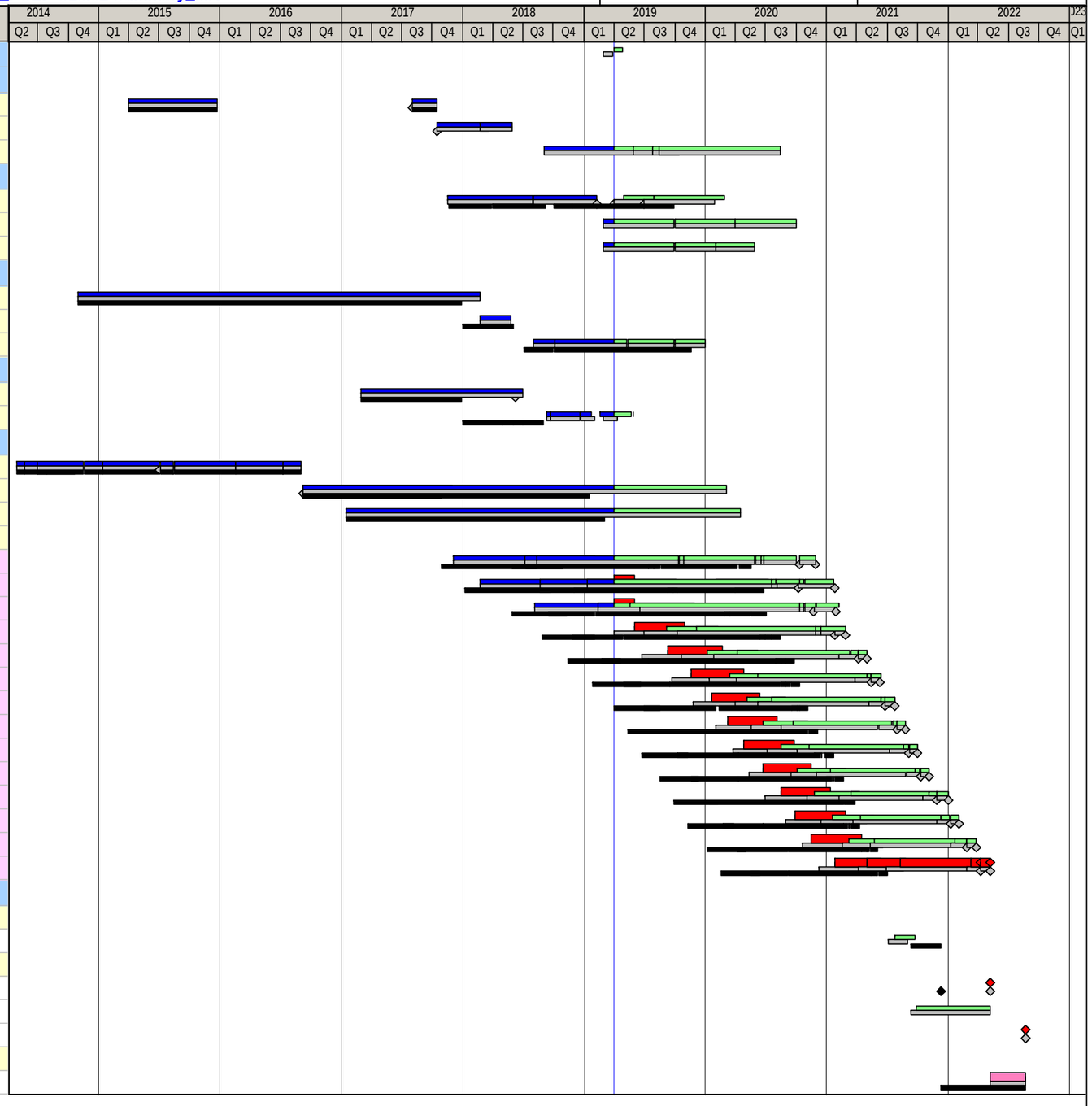

Actual Level of Effort | Progress | Critical | Prog Plan (C16.00) | Risk Contingency
Prog Plan (C16.00) | Remaining | Start Milestone | Last Months Update
Last Months Update | Near Critical | Finish Milestone | Critical Milestone



Filename: _C18.02 041919

MARCH 2019 SCHEDULE UPDATE IS DRAFT UNTIL FINALIZED AT APRIL 2019 MONTH END

| # | Activity Name | Duration | Start | Finish |
|---|---|---|---|---|
| 46 | **DRILL TRACK (TASI)** | 20d | 04-01-19 | 04-26-19 |
| 47 | **SCADA (Arinc)** | 1367d | 03-30-15 A | 08-13-20 |
| 48 | **PREPARE SOLE SOURCE & AWARD** | 649d | 03-30-15 A | 10-16-17 A |
| 49 | **DESIGN** | 157d | 10-16-17 A | 05-31-18 A |
| 50 | **IMPLEMENTATION, TEST, INSTALL & CUTOVER** | 495d | 09-04-18 A | 08-13-20 |
| 51 | **CEMOF (Various)** | 729d | 11-16-17 A | 09-30-20 |
| 52 | **CEMOF MODIFICATIONS (ProVen)** | 577d | 11-16-17 A | 02-26-20 |
| 53 | **PANTORGRAPH INSPECTION & MONITORING SYSTEM (Ctr TBD)** | 404d | 03-01-19 A | 09-30-20 |
| 54 | **SCISSOR LIFT WORK PLATFORM (Ctr TBD)** | 318d | 03-01-19 A | 05-29-20 |
| 55 | **TUNNEL MODIFICATION (ProVen)** | 1348d | 10-31-14 A | 12-31-19 |
| 56 | **DESIGN** | 840d | 10-31-14 A | 02-22-18 A |
| 57 | **BID & AWARD** | 66d | 02-23-18 A | 05-25-18 A |
| 58 | **CONSTRUCTION** | 370d | 08-01-18 A | 12-31-19 |
| 59 | **ELECTRIC LOCOMOTIVE (Amtrak / Mitsui)** | 584d | 03-01-17 A | 05-28-19 |
| 60 | **BID & AWARD** | 348d | 03-01-17 A | 06-29-18 A |
| 61 | **REHAB / TEST/ TRAIN / SHIP** | 181d | 09-10-18 A | 05-28-19 |
| 62 | **EMU (Stadler)** | 2092d | 05-01-14 A | 05-06-22 |
| 63 | **DEVELOP RFP, BID & AWARD** | 612d | 05-01-14 A | 09-02-16 A |
| 64 | **DESIGN** | 913d | 09-06-16 A | 03-05-20 |
| 65 | **PROCUREMENT (Material)** | 849d | 01-16-17 A | 04-16-20 |
| 66 | **MANUFACTURING & TESTING** | 1155d | 12-04-17 A | 05-06-22 |
| 67 | ***TRAINSET 1*** | 780d | 12-04-17 A | 11-27-20 |
| 68 | ***TRAINSET 2*** | 762d | 02-22-18 A | 01-22-21 |
| 69 | ***TRAINSET 3*** | 655d | 08-06-18 A | 02-05-21 |
| 70 | ***TRAINSET 4*** | 455d | 06-03-19 | 02-26-21 |
| 71 | ***TRAINSET 5*** | 430d | 09-09-19 | 04-30-21 |
| 72 | ***TRAINSET 6*** | 410d | 11-18-19 | 06-11-21 |
| 73 | ***TRAINSET 7*** | 395d | 01-20-20 | 07-23-21 |
| 74 | ***TRAINSET 8*** | 385d | 03-09-20 | 08-27-21 |
| 75 | ***TRAINSET 9*** | 375d | 04-27-20 | 10-01-21 |
| 76 | ***TRAINSET 10*** | 360d | 06-22-20 | 11-05-21 |
| 77 | ***TRAINSET 11*** | 360d | 08-17-20 | 12-31-21 |
| 78 | ***TRAINSET 12*** | 355d | 09-28-20 | 02-04-22 |
| 79 | ***TRAINSET 13*** | 355d | 11-16-20 | 03-25-22 |
| 80 | ***TRAINSET 14*** | 335d | 01-25-21 | 05-06-22 |
| 81 | **TESTING & STARTUP (JPB)** | 280d | 07-26-21 | 08-22-22 |
| 82 | **PRE-REVENUE TESTING** | 61d | 07-26-21 | 09-24-21 |
| 83 | Pre-Revenue Testing - Revenue Service | 61d | 07-26-21 | 09-24-21 |
| 84 | **REVENUE OPERATIONS** | 232d | 09-27-21 | 08-22-22 |
| 85 | Revenue Service Date (RSD) w/out Risk Contingency | 0d | | 05-06-22 |
| 86 | Phased Revenue Service | 156d | 09-27-21 | 05-06-22 |
| 87 | Revenue Service Date (RSD) w/ Risk Contingency (FFGA RSD) | 0d | | 08-22-22 |
| 88 | **RISK CONTINGENCY** | 108d | 05-07-22 | 08-22-22 |
| 89 | Risk Contingency (FTA) | 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: _C18.02 041919

MARCH 2019 SCHEDULE UPDATE IS DRAFT UNTIL FINALIZED AT APRIL 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** | **$27,781,170** | **$1,232,380** | **$22,147,590** | **$5,733,580** | **$27,881,170** |
| 10.02 Guideway: At-grade semi-exclusive (allows cross-traffic) | $2,500,000 | $0 | $0 | $2,600,000 | $2,600,000 |
| 10.07 Guideway: Underground tunnel | $25,281,170 | $1,232,380 | $22,147,590 | $3,133,580 | $25,281,170 |
| 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** | **$267,024,916** | **$3,982,451** | **$102,080,667** | **$179,657,710** | **$281,738,377** |
| 40.01 Demolition, Clearing, Earthwork | $3,077,685 | $330,000 | $2,701,000 | $376,685 | $3,077,685 |
| 40.02 Site Utilities, Utility Relocation | $92,728,599 | $703,106 | $33,684,903 | $73,742,715 | $107,427,617 |
| 40.02 Allocated Contingency | ($0) | $0 | $0 | ($0) | ($0) |
| 40.03 Haz. mat'l, contam'd soil removal/mitigation, ground water treatments | $2,200,000 | $636,438 | $2,550,983 | ($350,983) | $2,200,000 |
| 40.04 Environmental mitigation, e.g. wetlands, historic/archeologic, parks | $32,679,208 | $66,375 | $1,204,670 | $31,474,538 | $32,679,208 |
| 40.05 Site structures including retaining walls, sound walls | $568,188 | $0 | $0 | $568,188 | $568,188 |
| 40.06 Pedestrian / bike access and accommodation, landscaping | $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 | $114,237,209 | $2,246,531 | $61,939,112 | $52,512,540 | $114,451,652 |
| 40.08 Allocated Contingency | $20,485,000 | $0 | $0 | $20,285,000 | $20,285,000 |
| **50 - SYSTEMS** | **$519,533,064** | **$5,221,680** | **$67,497,122** | **$445,837,391** | **$513,334,513** |
| 50.01 Train control and signals | $99,483,668 | $1,420,554 | $9,738,829 | $89,744,839 | $99,483,668 |
| 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 | $70,984,821 | $917,306 | $16,608,578 | $54,483,844 | $71,092,422 |
| 50.03 Allocated Contingency | $28,150,860 | $0 | $0 | $28,043,259 | $28,043,259 |
| 50.04 Traction power distribution: catenary and third rail | $271,974,429 | $2,883,819 | $41,149,715 | $237,082,415 | $278,232,129 |
| 50.04 Allocated Contingency | $16,356,081 | $0 | $0 | $3,899,830 | $3,899,830 |
| 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** | **$596,206** | **$15,700,018** | **$19,975,067** | **$35,675,084** |
| 60.01 Purchase or lease of real estate | $25,927,074 | $596,067 | $15,621,443 | $10,305,631 | $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 | $139 | $78,574 | $921,426 | $1,000,000 |
| **70 - VEHICLES (96)** | **$625,755,807** | **$811,411** | **$141,360,697** | **$484,395,110** | **$625,755,807** |
| 70.03 Commuter Rail | $588,301,135 | $743,292 | $141,022,577 | $448,214,558 | $589,237,135 |
| 70.03 Allocated Contingency | $10,550,740 | $0 | $0 | $9,614,740 | $9,614,740 |
| 70.06 Non-revenue vehicles | $8,140,000 | $68,119 | $338,119 | $7,801,881 | $8,140,000 |
| 70.07 Spare parts | $18,763,931 | $0 | $0 | $18,763,931 | $18,763,931 |
| **80 - PROFESSIONAL SERVICES (applies to Cats. 10-50)** | **$328,829,428** | **$5,092,065** | **$262,656,030** | **$71,440,638** | **$334,096,668** |
| 80.01 Project Development | $130,350 | $0 | $280,180 | ($149,830) | $130,350 |
| 80.02 Engineering (not applicable to Small Starts) | $185,873,660 | $2,594,667 | $188,145,201 | $2,859,585 | $191,004,786 |
| 80.02 Allocated Contingency | $435,919 | $0 | $0 | $572,034 | $572,034 |
| 80.03 Project Management for Design and Construction | $72,987,401 | $1,818,905 | $56,856,528 | $16,130,873 | $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 | $658,073 | $9,844,902 | $20,410,632 | $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 | $20,420 | $3,949,731 | $2,391,869 | $6,341,599 |
| 80.06 Allocated Contingency | $556,000 | $0 | $0 | $556,000 | $556,000 |
| 80.07 Surveys, Testing, Investigation, Inspection | $3,287,824 | $0 | $20,957 | $3,266,866 | $3,287,824 |
| 80.08 Start up | $1,797,957 | $0 | $0 | $1,797,957 | $1,797,957 |
| 80.08 Allocated Contingency | $628,000 | $0 | $0 | $628,000 | $628,000 |
| **Subtotal (10 - 80)** | **$1,811,650,245** | **$16,936,193** | **$611,442,122** | **$1,214,090,273** | **$1,825,532,395** |
| **90 - UNALLOCATED CONTINGENCY** | **$112,022,051** | **$0** | **$0** | **$98,139,900** | **$98,139,900** |
| **Subtotal (10 - 90)** | **$1,923,672,296** | **$16,936,193** | **$611,442,122** | **$1,312,230,174** | **$1,923,672,296** |
| **100 - FINANCE CHARGES** | **$6,998,638** | **$258,845** | **$5,332,381** | **$1,666,257** | **$6,998,638** |
| **Total Project Cost (10 - 100)** | **$1,930,670,934** | **$17,195,037** | **$616,774,504** | **$1,313,896,430** | **$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] | - |

| **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** |
| 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 |
| 3/5/2019 | BBI-053-CCO-042A | TPSS-2 VTA/BART Pole Relocation (Design Only) | $110,000 | 0.32%[3] | $30,460,456 |
| 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 |
| | | **Total** | **$20,813,795** | **12.59%** | **$30,443,918** |

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.

## 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%** | **$665,078** |

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.

## 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] | - |

| 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** |
| 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% | - |
| 12/22/2018 | STA-056-CCO-015 | EMU Option Cars | $172,800,047 | 0.00%[2,3] | - |
| | | **Total** | **$172,693,057** | **(2.17%)** | **$28,141,963** |

Notes:

1. When the threshold of 75% is reached, staff may return to the Board to request additional authority.
2. Change approved by the Board of Directors – not counted against the Executive Director's Change Order Authority.
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** |
| | None to date | | | | |
| | | **Total** | **$0** | **0.00%** | **$5,507,778** |

Notes:

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

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# Appendix F – Risk Table

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## Listing of PCEP Risks and Effects in Order of Severity

| ID | RISK DESCRIPTION | EFFECT(S) |
|---|---|---|
| 303 | Contractor sequencing of foundation construction may result in inefficiencies in construction, redesign, and reduced production rates | More differing site conditions and longer to resolve.<br><br>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. |
| 279 | BBII may be unable to develop grade crossing modifications that meets stakeholder and regulatory requirements within the program schedule. | Delay to revenue service and associated costs for delay. |
| 14 | Late changes in vehicle specification or requirements. | Schedule delay.<br><br>Cost increase. |
| 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. |
| 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.<br><br>Rework resulting in cost increases and schedule delays |
| 267 | Additional property acquisition is necessitated. | 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 |
| 209 | Inadequate TASI resources may delay construction activities | • Delays to construction/testing.<br>• Delays to completion of infrastructure may delay acceptance of vehicles |

| 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 datafiles could affect what Balfour provides; could delay timing for testing; could change books that FRA had to review.<br>2. Full integrated testing between EMU and wayside cannot be conducted without PTC in place.<br>3. Delays to completion of signal system could result in conflicts with PTC testing and PCEP<br>construction and integrated testing.<br>4. Potential for track access impacts due to PTC testing. |
| 268 | Decisions on stakeholder requested changes to the vehicles (e.g., High Level Doors in lieu of windows as emergency exits) delays revenue service date. | Delays to completion of construction and additional cost to changes in design. |
| 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. |
| 240 | Property not acquired in time for contractor to do work.<br><br>Property Acquisition not complete per contractor availability date<br><>Fee<br><>Easement<br><>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. |
| 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. |
| 312 | Project executed the OCS Option; increase procurement durations for necessary OCS Parts (Conductor Rail) has led to an associated increase in costs and schedule duration for the overall project. This | Additional cost to project, primarily from additional bus bridges. |

| ID | RISK DESCRIPTION | EFFECT(S) |
|---|---|---|
| 304 | FRA has concerns in how bikes are placed on new EMUs. | Protracted negotiations with FRA to achieve original design |
| 67 | Relocation of overhead utilities must precede installation of catenary wire and connections to TPSs. Relocation work will be performed by others and may not be completed to meet BBII's construction schedule. | Delay in progress of catenary installation resulting in claims and schedule delay |
| 115 | Other capital improvement program projects compete with PCEP for track access allocation and requires design coordination (design, coordination, integration). | Schedule delay as resources are allocated elsewhere, won't get track time, sequencing requirements may delay PCEP construction, track access requirements must be coordinated. |
| 136 | UP reviews of BBI design may extend project duration. | Delays to completion of design and claims for delay. |
| 174 | Installation of electrification infrastructure may require the relocation of signals, which would affect the block design. | Cost and schedule impacts resulting from the design, construction, and testing of modified signal system and review of revised block design. |
| 261 | EMU electromechanical emissions and track circuit susceptibility are incompatible. | Changes on the EMU and/or signal system require additional design and installation time and expense. |
| 280 | Field equipment installed by D/B contractor may not communicate with the Central Control Facility (CCF), the Back-Up Central Control Facility (BCCF) through SCADA and function as designed. | Could require the acquisition and installation of additional equipment at BCCF and CCF. Could therefore require additional cost and time |
| 276 | BBII may be unable to get permits required by jurisdictions for construction in a timely manner. | Additional cost and time resulting from delays to construction |
| 277 | Inadequate D-B labor to support multiple work segments | Additional cost and time |
| 281 | Additional work in the form of signal/pole adjustments may be required to remedy sight distance impediments arising from modifications to original design. | Add repeater signals, design duct bank would result in increased design and construction costs. |
| 285 | Potential for inflation, (except with respect to Maintenance Option) to increase contractor costs. | Higher cost |
| 286 | Potential for wage escalation, (except for Maintenance Option) to increase contractor costs. | Higher cost |
| 287 | Design changes may necessitate additional implementation of environmental mitigations not previously budgeted. | Increased cost for environmental measures and delays to construct and overall delay in construction schedule |
| 296 | BBII needs to complete interconnection and traction power substations be sufficiently complete to accept interim power | Delay in testing and increased costs |

| 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.<br>• Contractor may not be able to complete notching and grouting work during 24 weekend shutdowns<br>• Notching work could adversely affect radio communication equipment in the tunnels; solution to avoid impact may not be developed in time to implement.<br>• Resolution of utility conflicts at portal structures. | Delays to completion of construction and associated claims costs. |
| 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. |
| 13 | Vehicle manufacturer could default. | Prolonged delay to resolve issues (up to 12 months)<br><br>Increase in legal expenses<br><br>Potential price increase to resolve contract issue |
| 10 | Delays in parts supply chain result in late completion of vehicles. | • Delay in obtaining parts / components.<br>• Cost increases. (See Owner for allocation of costs)<br>• 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<br>• Potential delay due to public protests or environmental challenge. |
| 56 | Lack of operations personnel for testing. | • Testing delayed.<br>• Change order for extended vehicle acceptance. |
| 88 | Construction safety program fails to sufficiently maintain safe performance. | Work stoppages due to safety incidents resulting in schedule delay and additional labor costs. |
| 161 | Unanticipated costs to provide alternate service (bus bridges, etc.) during rail service disruptions. | Cost increase. |

| ID | RISK DESCRIPTION | EFFECT(S) |
|---|---|---|
| 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.<br><br>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. |
| 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.<br>• Potential delays in construction schedule<br>• Risk is delay to BBI |
| 270 | OCS poles or structures as designed by Contractor fall outside of JPB row | Additional ROW Take, additional cost and time |
| 294 | UP does not accept catenary pole offsets from centerline of track necessitating further negotiation or relocation of poles | Delay to construction and additional costs for redesign and ROW acquisition. |
| 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. |
| 82 | Unexpected restrictions could affect construction progress:<br><> night work<br><> noise<br><> local roads<br><> local ordinances | • Reduced production rates.<br>• Delay |
| 119 | Coordination of electrification design with Operations | • Qualified individuals may not be available.<br>• 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 |

| ID | RISK DESCRIPTION | EFFECT(S) |
|---|---|---|
| 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<br><br>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. |
| 11 | Risks in achieving acceptable vehicle operations performance:<br><> software problems<br><> electrical system problems<br><> mechanical problems<br><> systems integration problems<br><br>Increased issues lately with vehicles regarding system integration and compatibility. | Cost increase.<br><br>Delays vehicle acceptance<br><br>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 |
| 154 | Potential for encountering unidentified or unknown underground utility crossings along the corridor.<br><br>Could impose unanticipated rights or requirements on the design. | Additional cost and time to acquire ROW by condemnation |
| 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.<br><br>Becomes problematic with concept of specifying "off-the-shelf" design. | Vehicle cost increase.<br><br>Vehicle delivery delay. |
| 272 | Final design based upon actual Geotech conditions | Could require changes |

| ID | RISK DESCRIPTION | EFFECT(S) |
|---|---|---|
| 250 | Potential for municipalities to request betterments as part of the electrification project. | Delay to project schedule in negotiating betterments as part of the construction within municipalities and associated increased cost to the project as no betterments were included in the project budget. |
| 251 | Subcontractor and supplier performance to meet aggressive schedule<br><>Potential issue meeting Buy America requirements | Delay to production schedule resulting in increased soft costs and overall project schedule delay. |
| 271 | Need for additional construction easements beyond that which has been provided for Contractor proposed access and staging | Additional cost and time |
| 288 | Independent checker finds errors in signal design and technical submittals | Additional cost and time |
| 289 | Coordination and delivery of permanent power for power drops for everything except traction power substations along alignment | Can't test resulting in delays to schedule and associated additional project costs. |
| 291 | Order/manufacture of long lead items prior to 100% IFC design document that proves to be incorrect | Design change and/or delays |
| 292 | Potential that UPS will not fit in the spaces allotted to communications work within the buildings. | Requisite backup capacity units under design criteria could result in the need for larger unit than originally planned resulting in design and fabrication changes and associated schedule delays and costs. |
| 19 | Potential for vehicle delivery to be hampered by international conflict; market disruption; labor strikes at production facility. | Delay in production of vehicle with associated cost implications. |
| 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.<br><br><>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<br><br>Schedule delay |

| ID | RISK DESCRIPTION | EFFECT(S) |
|---|---|---|
| 61 | Latent defects in EMU vehicles. | Unbudgeted costs incurred from legal actions.<br><br>Repairs take trains out-of-service. |
| 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<br>• $3-$5M/month burn rate for Owner's team during peak | Delays to project schedule and additional costs for preparation and review of submittals. |
| 252 | Failure of BBI to order/manufacture long lead items prior to 100% IFC design document approval by JPB | Delays to project schedule and additional cost for contractor and JPB staff time. |
| 266 | 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 |
| 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:<br><> FTA<br><> FRA<br><> 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 |

| ID | RISK DESCRIPTION | EFFECT(S) |
|---|---|---|
| 53 | Failure to meet Buy America requirements.<br><br>(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.<br><br>(BA is not negotiable) |
| 54 | Infrastructure not ready for vehicles (OCS, TPS, Commissioning site / facility). | Increases cost if done off property |
| 69 | Potential need for additional construction easements. Especially for access and laydown areas.<br><br>Contractor could claim project is not constructible and needs more easements after award. | Increased cost<br><br>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. |
| 93 | Unanticipated subsurface conditions affecting pole or TPSS installation. | • Delay taking actions to remedy conditions or relocate foundations.<br>• Increased cost for design and construction of remediation |
| 106 | Potential that DB contractor will have insufficient field resources (personnel or equipment) to maintain aggressive schedule.<br><br>Multiple segments will need to be under design simultaneously.<br><br>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.<br><br>Possible shortages with other specialty crafts as well. | Delay. |
| 146 | Wayside signal / pole adjustments to avoid sighting distance problems. | Change order. |
| 151 | Public could raise negative concerns regarding wheel/rail noise. | Increased cost to mitigate:<br><> grind rails<br><> reprofile wheels<br><> sound walls |

| ID | RISK DESCRIPTION | EFFECT(S) |
|---|---|---|
| 182 | Compliance with Buy America requirements for 3rd party utility relocations.<br><br><>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<br><>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%<br><>Risk is substation not relocations<br><>Substation equipment is available domestically, has 6 month longer lead time and increased cost of 20% | • Increased cost<br>• Delay |
| 192 | Environmental compliance during construction.<br>- Potential impact to advancing construction within the vicinity of any cultural finds that are excavated.<br>- Failure to meet the commitments contained within the PCEP EA, FEIR and permit conditions | • Delay<br>• 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:<br>• Fire, police, and first responders<br>• Local communities<br>• 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. |

| ID | RISK DESCRIPTION | EFFECT(S) |
|---|---|---|
| 248 | 3rd party coordination<br><>Jurisdictions, Utilities, UP, Contractors<br><>D/B needs to provide timely information to facilitate 3rd party coordination<br><>Risk is for construction | Delays in approvals resulting in project schedule delays and associated costs. |
| 249 | Coordination and delivery of permanent power for power drops along alignment | Delays in completion of construction and testing with associated increase in costs. |
| 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 |
| 254 | Potential that bridge clearance data are inaccurate and that clearances are not sufficient for installation of catenary. | Results in additional design and construction to create sufficient clearance. |
| 269 | Potholing unearths the fact that pole locations conflict with utilities. OCS pole or structure locations as designed by Contractor conflict with utilities where conflict could have been avoided by allowable final design adjustments. | Additional cost and time |
| 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 |
| 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 |
| 189 | EMUs will need I-ETCS equipment that is compatible with wayside equipment. Same supplier thereby reducing the risk. | Could drive up price because the car builder may not be a priority customer. |

| ID | RISK DESCRIPTION | EFFECT(S) |
|---|---|---|
| 297 | Cost and schedule of Stadler contract could increase as a result of this change in PTC system<br><br>Delay of PTC may delay acceptance of EMUs. | 1) Full integrated testing between EMU and wayside cannot be conducted without PTC in place.<br><br>2) Delay in EMU final design for PTC and potential PTC interfaces. Need to finalize braking system sequence priority. |

# Appendix G – MMRP Status Log

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**Mitigation Monitoring and Reporting**

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

**Mitigation Monitoring and Reporting**

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

**Mitigation Monitoring and Reporting**

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

**Mitigation Monitoring and Reporting**

| Mitigation Measure | Mitigation Timing | | | | Status | Status Notes |
|---|---|---|---|---|---|---|
| | Pre-Construction | Construction | Post-Construction | Operation | | |
| **BIO-1f: Implement western burrowing owl avoidance measures.** | **X** | **X** | | | Ongoing | Protocol surveys for Western Burrowing Owl were conducted from April 2017 through July 2017 at previously identified potentially suitable habitat locations. Note that all of these locations are in Construction Segment 4 (southern Santa Clara and San Jose). No Burrowing Owls were observed during the surveys. Construction in Segment 4 commenced in 2018. Prior to construction activities in Segment 4, pre-construction surveys of the potential habitat areas occured 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 will continue through July 2019 (with 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. One new active nest (Killdeer) was observed during this reporting period, and a no-disturbance buffer was placed around the nest, until the nest is determined to no longer be active. |
| **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 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. |

**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. |