MONTHLY MONITORING REPORT
May 2017

Central Subway Project
San Francisco Municipal Transportation Agency (SFMTA)
San Francisco, CA

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PMOC Contract No.: DTFT6014D00010
Task Order No. 5
Project No.: FTA-13-0294

Work Order Number: 002
OPs Referenced: 01 and 25
CLIN 0002B

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Time on project: 3 years

EXECUTIVE SUMMARY

Project Description

The Central Subway Project (CSP) involves construction of a 1.7-mile extension of Muni's T Third Line along 4th Street and Stockton Street in downtown San Francisco. The CSP is Phase 2 of the San Francisco Municipal Transportation Agency's (SFMTA) T Third Light Rail Transit (LRT) Project. Phase 1 of the project constructed a 5.1-mile LRT line along the densely populated 3rd Street corridor. Revenue service commenced on the T Third Line in April 2007. The CSP will extend the T Third Line from the 4th Street Caltrain Station to Chinatown, providing a direct, rapid transit link from the Bayshore and Mission Bay areas to South of Market, Union Square, and downtown.

Four new stations are being constructed as part of the project—an at-grade station at 4th and Brannan streets and three underground stations at Yerba Buena/Moscone Center (YBM), Union Square/Market Street (UMS), and Chinatown (CTS). Four light rail vehicles (LRVs) are included in the budget for the CSP as part of a larger procurement that will replace the entire LRV fleet. Average weekday boardings are projected to be 43,521 in 2030.

Project Status

The project has been under construction since February 2010. *At the end of April 2017, the project was 67.1% complete based on expenditures* and there was one active construction contract: 1300 Stations and Systems/Trackwork. *That contract was 54.43% complete based on incurred cost at the end of April 2017. Substantial completion was originally scheduled for February 2018, but the latest master program schedule update forecasts substantial completion on June 26, 2019, a delay of 502 days (21 days later than March's forecast).* The contractor has submitted revised schedule updates through April 2017. *SFMTA returned the February and March updates to Tutor Perini Corporation (TPC) approved as noted and the April update is under review at this time.* The master schedule information for the project is based on SFMTA's latest update of the construction schedule, which indicates a forecast Revenue Service Date (RSD) of *December 10, 2019. This is 349 days later than the required RSD* of December 26, 2018 in the Full Funding Grant Agreement (FFGA).

The Project Management Oversight Contractor (PMOC) notes that the forecast RSD moved 26 days later during April 2017, implying that only 4 days of planned work on the critical path was accomplished in the month. The RSD has moved 91 days later over the past 4 months.

In the opinion of the PMOC, the ongoing month-by-month extension of the projected RSD is detrimental to effective management of the project. When project team members see that target completion dates are consistently extended, the motivation to work towards the target dates is lost. The Big Hairy Audacious Goals (BHAGs) that have been identified for each of the work packages have been ineffective in arresting the accumulation of delays. The PMOC will convene a schedule workshop in July 2017 with the objective of identifying a range of achievable dates for completion of construction and for the start of revenue

service. An achievable substantial completion date for the 1300 Contract is likely several months later than the current forecast of *December 2019.*

SFMTA completed an update of the Rail Activation Plan (RAP) as part of its annual update of the Project Management Plan (PMP) and distributed the updated version of the report in April 2017. The RAP now provides additional detail on the testing, commissioning, and start-up activities that will influence the RSD for the project. *SFMTA has also delivered an updated program master schedule that includes the start-up and testing activities identified in the RAP.* ***This program master schedule will provide the basis for analysis of the achievable RSD for the project and identification of schedule containment strategies at the upcoming schedule workshop.***

Table 1 - Core Accountability Items

Project Status: *(as of April 30, 2017)*		**Original at FFGA:**	**Current Estimate:**
Cost	Cost Estimate	$1,578,300,000	$1,578,300,000
Contingency	Unallocated Contingency	$74,722,000	$8,880,402 (no change from March)
	Total Contingency (Including Approved Contract Changes)	$185,500,000	*$76,147,036* *(no change from March)*
Schedule	Revenue Service Date	12/26/2018	*12/10/2019* (SFMTA forecast)
Total Project Percent Complete	Based on Expenditures	*67.10%*	
	Based on Earned Value	*65.89%*	
Major Issues	**Status**	**Comments/Planned Action**	
Schedule Contingency	Based on the latest program master schedule, there is negative schedule float of approximately 8 months.	The minimum schedule contingency agreed to at this stage of the project is 6.0 months. *The project is nearly 12 months behind schedule and it is likely that further delays will occur.*	
Cost Contingency	*The current Total Contingency is $76.1 million.* The Federal Transit Administration (FTA) recommends a minimum contingency level of $60 million.	*Accumulating delays will likely lead to an increase in project soft costs There is also a risk that the contractor will be successful in its claims for compensation for increased delay-related costs. These cost items could consume some of the contingency but it appears that there is sufficient cost contingency to cover these items and other project cost risks. SFMTA also has the right to assess liquidated damages for delays that are the responsibility of the contractor.*	

Technical Capacity and Capability	*The Resident Engineer (RE) recently reassigned to the UMS work package will be leaving the project soon and SFMTA is recruiting for field construction inspectors with MEP experience.*	*Staff turnover at the RE level will create a challenge for resolution of outstanding cost and delay claims. SFMTA should develop a plan for filling the vacancies on the project team.*
Date of Next Quarterly Meeting:		*August 3, 2017*

Earned Value (EV): *$1,039,972,892, an increase of $8.09 million from March. Earned value for the month of April was higher than the value for March, but still well below the planned increase in earned value of more than $18 million.* The earned value performance of the project is consistent with the reported schedule performance, confirming that the project is falling further behind schedule as time goes on.

Planned Value (PV): *$1,370,178,677, a planned increase of $18.24 million from March.*

Actual Cost (AC): *$1,058,979,469, an increase of $13.33 million from March.*

Cost Performance Index (CPI): 0.98. A value greater than 1 means that value of the work completed is more than the cost of the work (under budget) and less than 1 means that the value of the work is less than the cost of the work (over budget). ***The PMOC notes that the cost of work performed in April continued to be higher than the increase in earned value, although the difference was less than in previous months.***

Schedule Performance Index (SPI): 0.76. SPI greater than 1 is ahead of schedule and less than 1 is behind schedule. SFMTA has identified the minimum acceptable SPI to be 0.90.

Contingency

Cost Contingency

The total available contingency (approved contingency less approved contract changes) *as of April 30, 2017* was $76,147,036, which is above the minimum required contingency of $60 million *and unchanged from March. A total of 68 contract modifications had been executed for the 1300 Contract with a total value of $7.25 million as of June 7, 2017. Four new contract modifications had been executed since the publication of SFMTA's April 2017 Progress Report.*

In the opinion of the PMOC, SFMTA's cost forecasts should recognize the possibility of increased soft costs due to project delays as well as the potential for contractor claims of increased costs due to delays beyond its control. Despite the potential for higher soft costs and delay claims, the available cost contingency appears to be sufficient to provide reasonable assurance of on-budget completion of the project. SFMTA and the contractor are encouraged to continue to identify additional schedule recovery strategies to reduce the potential for delay-related costs and to continue to work to resolve long-standing time impact claims.

Schedule Contingency

All contingency in the schedule has been consumed, and there is nearly 12 months of negative float. Further delays are likely because the contractor has not demonstrated that it can achieve the planned production rates for mining work for the CTS caverns.

PMOC Observations, Opinions, and Concerns

The PMOC is concerned that construction progress on critical path work in April continued to be well below plan. The forecast completion date moved 26 days later, implying that actual progress was far less than the planned progress.

In the opinion of the PMOC, the ongoing month-by-month extension of the projected RSD is detrimental to effective management of the project because the project team does not have achievable schedule targets to manage to. SFMTA and the contractor are encouraged to develop an achievable schedule for completion of the remaining work that reflects reasonable production rates for critical path work based on the actual production rates being achieved. In the opinion of the PMOC, although setting and working toward the short term milestones may be encouraging cooperation and collaboration between TPC and SFMTA in advancing the current work, this practice has been ineffective in arresting the ongoing schedule slippage.

A schedule workshop is planned for July 2017 to evaluate potential time saving measures and assess the likely range for the RSD of the project. *In order to establish an achievable RSD, the time required to complete the remaining Sequential Excavation Method (SEM) work at CTS must be determined based on realistically achievable production rates that reflect the actual conditions for this work. To determine whether any time savings for the subsequent work are possible, a comprehensive view of the lines of work that are driving the RSD must be taken by SFMTA. Efforts must be made to improve the work sequence and advance elements of the testing and commissioning activities near the end of the project in order to improve the RSD.*

Coordination between the CSP and SFMTA's operations management should continue with the objective of establishing a firm schedule for commissioning and start-up activities.

The PMOC remains concerned that unresolved responsibility for the accumulated delays to date is hindering SFMTA and TPC from working together to identify schedule mitigation measures. *The PMOC also notes that the contractor has issued a large number of new certified contract claims and change order requests and that the agency and contractor positions regarding responsibility for incurred delays are generally far apart. The parties are using the Dispute Review Board (DRB) process to document their positions, which is helping to limit confrontations. However, it appears likely that resolution of the time-related contract disputes will challenging and time consuming.*

The PMOC recommends that SFMTA recognize the likelihood of increased soft costs associated with schedule delays in its forecast of potential cost increases.

TABLE OF CONTENTS

TABLE OF TABLES

APPENDICES

A. PROJECT STATUS

Full Funding Grant Agreement (FFGA)

The FFGA was signed on October 11, 2012.

Design

Design is complete.

Construction

Contract 1250 (UR #1). This completed contract relocated utilities within the footprint of the proposed Yerba Buena/Moscone Center (YBM) Station.

Contract 1251 (UR #2). This completed contract included the relocation of utility lines within the footprint of the proposed Union Square/Market Street (UMS) Station and temporarily rerouted existing trolley coach lines around the construction zone.

Contract 1252 Tunnel. This completed contract included the construction of 1.5 miles of twin tunnels excavated by tunnel boring machines and construction of the tunnel portal, retrieval shaft and five cross-passages. Final completion has been achieved, and financial close out should occur in 2017. San Francisco Municipal Transportation Agency (SFMTA) is still working to reach resolution on the amounts that are due to the stations contractor to cover extra costs related to non-conforming work by the tunnel contractor. The tunnel contractor also must repair leaks in the tunnel and some of the cross passages before the contract can be closed out. Coordination of access to the tunnel for the leak repair work with ongoing station construction has been challenging. Access for the tunnel contractor to make leak repairs has been approved by the stations contractor and the tunnel contractor is preparing a schedule for the work. Bay Area Rapid Transit (BART) accepted the removal of instruments related to the Central Subway Project (CSP) tunnel and has issued a release of claims regarding the undercrossing of BART's tunnels at Market Street. *BART has confirmed in writing that it has received payment from the tunnel contractor for BART's costs related to the CSP tunneling work and all BART-related issues affecting closeout of the tunnel contract are closed.*

It appears likely that this contract will close out with a final cost less than $2 million over the original contract value, with change orders of less than 1% of the contract amount, which is very good cost control performance compared to typical infrastructure projects.

Contract 1300 (Combination of UMS, CTS, YBM, and STS). This contract includes the construction of three underground stations, one surface station, all surface works required for the installation of Light Rail Transit (LRT) between 4th and King streets and the tunnel portal, and all LRT track and systems components. *As of the end of April 2017, the construction of the Stations and Surface, Track, and Systems Contract was 54.43% complete based on cost and 55.67% complete based on the value of completed construction.*

Union Square/Market Street Station (UMS): The latest Big Hairy Audacious Goal (BHAG) for this work package was to complete excavation and placement of support of excavation for the

station box by June 1, 2017. *The goal was not achieved and the due date has yet to be revised. The Project Management Oversight Contractor (PMOC) observed that sections of the tunnel liner were being removed from the station box, indicating that the excavation to the invert level is well underway. According to the 4-week look-ahead schedule dated June 5, 2017, placement of walers for the invert level will start on June 20 and placement of struts will start 1 week later. The duration of these activities was not disclosed.*

Final utility placements continued at the triangle formed by Market Street, the westbound lane of Ellis Street, and the western end of the Ellis Street Annex. Relocation of an AT&T duct bank was being completed during the week of June 5. The contractor's 4-week look-ahead schedule did not indicate start or end dates for the remaining activities necessary to fully reopen the street to traffic and pedestrians. SFMTA's senior CSP management staff indicated that the prolonged disruption of traffic and pedestrians associated with the Ellis Street construction zone was becoming unacceptable. SFMTA indicated that it would actively assist the contractor in gaining resolution of remaining issues with San Francisco Water Department (SFWD) and SFgo traffic signal equipment. In the opinion of the PMOC, SFMTA management is taking appropriate (although probably overdue) action to move this work forward. The Ellis Street area should be completed expeditiously and opened for traffic and pedestrian use so that project resources can be focused on critical path work.

At the north concourse, a Pacific Gas & Electric Company (PG&E) electrical vault and duct bank for the station permanent power were completed and the area was scheduled to be backfilled and asphalt paving patched during the week of June 5. Soil nail walls for the fan room in the Union Square Garage work area were completed and SFMTA was working with the contractor to finalize the waterproofing details for this area prior to placement of the permanent structural walls. Structural steel for the new station entrance in the garage area has been completed, and utilities and mechanical systems are being installed prior to placement of lightweight concrete for backfill. *Mechanical, electrical, and plumbing (M/E/P) rough-in and construction of interior walls is underway at the concourse level of the north entrance, and work is continuing on the mechanical duct chase at the bottom level of the north entrance.*

Chinatown Station (CTS): *Excavation of the bottom left and right side drifts and invert was completed in the southbound direction on May 30. The southbound bottom side drifts and invert were scheduled to be complete by the end of May. Work on the top center drift started on May 1 for the southbound direction and on May 22 for the northbound direction. Minor work on the crossover cavern side drifts also started in early May. SFMTA reported that although the work on the crossover cavern was not scheduled to start until August, no significant schedule recovery is expected to result from advancing this work.*

The mining work has continued to take much longer than planned in the baseline schedule. *The projected project completion date slipped 26 days in April due to slow production for this critical path work. Mining work was suspended for a period of time while compaction grouting was undertaken to arrest settlement of buildings adjacent to the excavation zone.* The contractor is continuing to work two 12-hour shifts 6 days per week on the mining work at CTS in an attempt to mitigate the schedule impacts of the low production rate.

The BHAG for completion of the mining for the platform cavern was revised to September 1, 2017 from June 15, 2017, an extension of 78 days. The PMOC and SFMTA have agreed to schedule a schedule containment workshop in July, after the originally planned completion date for the platform cavern. The actual production rates achieved for the platform cavern work will be used to project the likely completion date for the crossover cavern, which is the last mining work on the project critical path.

Yerba Buena/Moscone Station (YBM): The latest BHAG for YBM was to complete the station box invert slab on April 15 and the headhouse invert slab on April 30. *The final invert pours for the station box and the headhouse were completed on May 17, about 2 weeks later than the goal. New BHAGs have not been defined for the YBM work package.*

Remaining subsurface utility work along Clementina Street and subsequent restoration of that street is being coordinated with the planned opening of a new hotel on the northwest corner of Clementina and 4th streets. The most recent projection for the opening date of the hotel was July 2017, *but construction progress evident from outside the hotel construction site indicates that the opening will likely be delayed.*

Work to install a 36-inch sewer force main in 4th Street was underway with potholing completed in early June. Muni overhead power lines for an emergency turnaround at 4th and Howard streets need to be temporarily removed or relocated in order to complete excavation for the force main. SFMTA and the contractor are working on a plan for the relocation and subsequent installation of the sewer line, which will extend into July. At Folsom Street, the contractor plans to start construction of the structure for emergency egress stair 4 on May 19 following the removal of an undisclosed underground storage tank. Final utility installations in the Folsom Street intersection will follow, including sewer, Alternative Water Supply System (AWSS), and electrical work that will extend over an 8 to 9-week period.

Finishing work continued on the mezzanine and concourse levels of the station. *Plaster work is underway, along with electrical rough-in work. Stair installation and preparation for placement of the permanent station walls is underway at the platform level. Completion of the invert slab is being followed by removal of the temporary support system of walers and struts at the lowest level of the station. In the headhouse, preparation is underway for the bottom-up construction of the final structure. The areas to be occupied by stairs and elevators are being cleared to provide space for installation of these vertical circulation elements.*

Surface, Track, and Systems (STS): The latest BHAGs for this work package include:

- Complete all utility work and pavement restoration south of Bryant Street by May 31, 2017 – *missed and update needed.*
- Complete all utility work and pavement restoration through the Bryant Street/4th Street intersection to the portal by July 15, 2017 – *will be missed and update is needed.*
- Start trackwork at 4th and King streets by May 1, 2017 – *missed and update needed.*

Utility conflicts continue to impact the completion of the street improvements that will allow work on the trackway in the center of 4th Street to commence *but the number of conflicting*

utilities is declining. PG&E needs to install a 4-inch gas line at 4th and Brannan and 4th and Townsend streets. PG&E did not start this work as planned on May 30, which may impact TPC's plans to stockpile and weld rail strings in the median of 4th Street. SFWD needs to complete connections for water pipes at 4th and Welsh. All of this work was expected to be completed in early April but now has extended into June. Completion of two large sewer mains between Welsh and Bryant streets is underway, and the conflicting AT&T duct bank in the 4th and Bryant intersection has been removed. AT&T has provided support to Tutor Perini Corporation's (TPC) work to install shoring for the sewer line installation, assisting in assuring that live AT&T cables are not damaged.

SFMTA and the contractor continue to evaluate solutions to problems with the sidewalk surface where new sidewalk panels installed by the contractor interface with the existing sidewalk panels. *The center panel, adjacent to the panels installed by the contractor will be replaced along a short section of sidewalk between Brannan and Freelon streets. This section of sidewalk has been removed and design is being completed for the replacement sidewalk panels that will bridge between the new work installed by the CSP at the curb and the existing sidewalk panels adjacent to the buildings.*

The transition slab between the cut and cover tunnel and the bored tunnel originally was completed on June 2. The contractor continues to complete the track invert slab in small remaining sections of the tunnel as station construction work allows.

Despite the focused attention of the CSP's senior management team on achievement of the short term BHAGs, these goals have not arrested the ongoing schedule slippage, and the projected Revenue Service Date (RSD) moved *26 days later in the latest reporting period.* As discussed in the Schedule section of this report, the trend of schedule slippage due to lower than planned production and a need to suspend the CTS Sequential Excavation Method (SEM) mining *continued in April.* **Improved performance for the mining operation must be achieved immediately, and sustained and additional time savings must be identified for all four lines of work that are driving the current RSD in order to *avoid further delays to the current forecast RSD of December 10, 2019.***

In the opinion of the PMOC, the ongoing month-by-month extension of the projected RSD is detrimental to effective management of the project because the project team does not have achievable schedule targets to manage to. SFMTA and the contractor are encouraged to develop a mutually agreed and achievable schedule for completion of the remaining work including any realistic schedule recovery strategies and appropriate schedule float to absorb future delays that will inevitably occur. Such a schedule should be developed as soon as possible. *The PMOC will convene a schedule workshop in July 2017 with the objective of identifying a range of likely feasible construction completion dates and RSDs.*

Third Party Agreements Including Utilities, Railroads, Other Agencies, Etc.

Bay Area Rapid Transit (BART)

BART has accepted the work for removal of CSP instrumentation in the BART tunnel *and has issued releases of SFMTA for liability. BART has provided confirmation that it has received payment from the tunnel contractor for agency costs associated with the tunneling work, which closes out the SFMTA-BART coordination for the tunnel contract.*

California Department of Transportation (Caltrans)

An Encroachment Permit is needed to install electrical and traffic signal equipment at the I-280 off ramp. SFMTA is working to obtain the permit for the work, which is not on the critical path.

CPUC

The California Public Utilities Commission (CPUC) is participating in the various safety meetings, including the Safety and Security Certification Review Committee (SSCRC) and Fire and Life Safety Committee (FLSC) meetings. Representatives of the CPUC also regularly attend the SFMTA/Federal Transit Administration (FTA) Quarterly Progress Review Meetings (QPRM). The FLSC has begun to address the certifiable items list for the Stations Contract. Rail crossing permits from CPUC are required for the at-grade portion of the project alignment. CPUC has provided the permits but they will need to be extended as the permits call for the crossings to be in operation before the scheduled completion of the CSP project.

San Francisco Public Utilities Commission (SFPUC)

Coordination is ongoing for the installation of new water and sewer facilities along 4th Street.

San Francisco Department of Public Works (SFDPW)

No updates to report.

San Francisco Parks and Recreation Department

No updates to report.

Private Property Owners

All real estate acquisitions have been completed. There will be a need to extend the duration of some of the licenses for compensation grouting. A number of private property owners and businesses have issued claims for damage associated with the project construction. These claims are being handled by the contractors' builder's insurance policies, and the contractor has demonstrated improved responsiveness to damage claims that are associated with ongoing construction work.

Status of Vehicle Design, Procurement, Testing, and Integration

Vehicle design and fabrication is underway by Siemens Corporation for four Light Rail Vehicles (LRVs) for the Central Subway, 20 LRVs for near-term fleet expansion, and 151 LRVs for fleet

replacement. Options for up to 85 additional vehicles are available for fleet expansion. The vehicle design and assembly process is reported to be on schedule. *Three cars had been delivered to SFMTA as of the end of April, with a fourth car nearing completion and delivery.* Dynamic testing, including clearance tests on the existing Muni tracks is underway for the first car and static tests are being performed on the second car. Production of eight additional cars continues at the assembly plant.

Real Estate

All project right-of-way has been acquired, and all commercial and residential relocations are complete.

Labor Relations and Policies

Appendix G of the Project Monthly Report details the Small Business Enterprise (SBE) goals and actual participation on each contract as of *March 31, 2017.* SFMTA contract goals range from 6% to 30% on each of the contracts. The majority of the contracts have met these goals to date.

Compliance with Applicable Statutes, Regulations, Guidance, and FTA Agreements

The 1300 contractor had previously raised the possibility of Buy America compliance issues with cooling equipment for the three underground stations. In the case of the cooling equipment, the contract specifications for the Variable Refrigerant Flow (VRF) cooling units identify four manufacturers that are all foreign, and the contractor has not been able to identify a domestic supplier that can meet the specifications. SFMTA has indicated that it intends to seek a waiver of Buy America requirements for this equipment, citing examples from other FTA-funded projects where waivers were granted by FTA for similar equipment. SFMTA is assembling information in advance of scheduling a meeting with FTA to discuss the proposed waiver request.

B. PROJECT MANAGEMENT PLAN AND SUB-PLAN IMPLEMENTATION

Project Management Plan (PMP)

SFMTA delivered an update of the PMP in April 2017. The reporting relationships for the quality function have been revised due to the departure of SFMTA's Capital Programs and Construction Quality Manager.

Environmental Assessment/Mitigation Plan/Archaeological Plans

The PMOC received the Fourth Quarter 2016 Mitigation Monitoring Reporting Program (MMRP) update from SFMTA on February 17, 2017.

Real Estate Acquisition Management Plan (RAMP)

The RAMP Revision 5, dated September 26, 2013, was submitted to FTA on November 19, 2013. All required real estate for the project has been acquired in accordance with the RAMP.

Quality Assurance/Quality Control (QA/QC) Program Plan

See section F.

Safety and Security Management Plan (SSMP)

See section H.

Risk and Contingency Management Plan (RCMP)

See section I.

C. PROJECT MANAGEMENT CAPABILITY AND CAPACITY

Agency Staff

Several CSP project staff members continue to be focused on development of an as-built record of the construction for the 1300 Contract. This effort requires support from the field management staff for each of the work packages. The updates have been completed for all stations through April 2017.

SFMTA reported that the Resident Engineer (RE) originally assigned to the YBM work package who had been assigned as the RE for UMS will now be leaving the project. ***In the opinion of the PMOC, the ongoing turnover of field construction staff is detrimental to the effective management of the UMS work package.*** *SFMTA reported that the previous UMS RE is working part time to address the backlog of contractor change order requests.* The Assistant Resident Engineer (ARE) for the YBM work package has been promoted to RE for that package. Recruitment for the UMS ARE position is underway. Two new Office Engineers started work in April. *SFMTA reported that it is recruiting for construction inspectors with MEP experience.*

Several long-standing major change orders and time impact claims remain to be resolved, but SFMTA has initiated discussions with the contractor on some of the oldest issues, including the impacts of a PG&E power pole on demolition work at the CTS headhouse. SFMTA reported that it is now meeting with the contractor on a weekly basis to address delay claims, including any additional compensation that may be due to the contractor, beginning with the work at CTS that preceded the start of excavation. SFMTA and TPC are planning to submit information regarding the time impact claims at CTS to the Dispute Review Board (DRB) in an attempt to reach resolution on these issues. **In the opinion of the PMOC, this is an appropriate use of the DRB.**

The PMOC will continue to monitor the SFMTA's progress in clearing the backlog of pending change orders. A new action item for SFMTA to include metrics for the time needed to progress identified potential contract changes and contractor change order requests through the various stages of resolution was identified.

Contractor Staff

There were no changes in the contractor's management staff.

D. PROJECT COST STATUS

Project Cost Control Systems

SFMTA continued to maintain the Trend Log and logs of Change Order Requests (COR) and Proposed Contract Changes (PCC) for Contract 1300 using CM13. The Trend Log includes all potential changes in contract value, including items that, in the opinion of the CSP staff, are not merited and new items for which merit has not been determined. The companion contract change management log includes items that have been determined to have merit and are progressing through negotiations toward a contract modification (CMod). SFMTA is working to improve the timeliness of processing determinations of merit as well as the progression of pending contract changes and completion of CMods by creating summary tables of the numbers of items that are in the various stages of processing. **In the opinion of the PMOC, the trend log tracking should include the amount of time that has passed from the initial identification of the trend, and a new action item has been identified for SFMTA's response.** *Four new modifications to the contract were executed between early May and early June 2017.*

The most recent versions of the Trend Log and Trend Summary documents are dated June 7, 2017. A total of 68 contract modifications had been executed for the 1300 Contract as of that date. The total value of executed CMods was $7,245,928. Note that tables 2 and 3 reflect the project status as of the end of *April 2017* and show different values for approved contract changes.

Project Cost (*as of April 30, 2017*)

Cost estimate: $1.5783 billion.

Total contingency: *$76.15 million* (minimum contingency is $60 million), *no change from March.*

Actual Cost (AC): $*1,058,979,470, an increase of $13.33 million from March (67.10% of the total project budget).*

Current funding level: $1,329,794,000 (84.3% of the total project budget).

Earned Value (EV): *$1,039,972,892, an increase of $8.09 million from March.*

Cost Performance Index (CPI): *0.99.*

CPI is a measure of cost efficiency on a project. It is the ratio of EV to AC. A CPI equal to or greater than 1 indicates a cost underrun, and a value of less than 1 indicates a cost overrun. A value of 0.9 or greater is considered acceptable, considering the margin of error in estimating the value of completed work. The PMOC noted that the cost of work performed in January and February was much higher than the increase in earned value. *The value of work performed in April was closer to, but still less than, the cost of the work.*

Project Cost Trends

SFMTA tracks potential changes in project cost, calling these potential changes "trends." Trends include all potential changes in the contract value. As the status of an identified trend changes, it

may become a contract modification, it may become an item that is paid on a force account basis, or it may be denied/closed with no impact to the project cost. Extra cost items identified by the 1300 contractor that CSP management concludes have no merit are carried in the total trend amount at *a lower value than the contractor's estimate of extra costs, with the value reflecting SFMTA's assessment of the likelihood that the change would ultimately be approved through mediation or other contract dispute resolution measures.*

Table 2 summarizes the trends for the two construction contracts that have not attained financial close out. The remaining contingency, less identified trends, represents about *45%* of the potential left to spend for Contract 1252. *After potential changes are accounted for, there is now only $4.17 million in contingency remaining for Contract 1300.* **The resulting contingency of *1.1*% of potential remaining spending after potential changes are accounted for is tight, but unallocated contingency and excess contingency for other elements of the program are likely sufficient to allow on-budget completion of the CSP**. *The combined allocated contingency for all construction work less identified trends is now $7.06 million or 1.8% of the potential remaining work.* **In the opinion of the PMOC, the allocated contingency for the 1252 Contract is greater than the amount required to assure final close out of the contract within the budget. The allocated contingency for the 1300 Contract is more in line with the likely contract cost given the pending contract changes, but there is a significant likelihood that additional contingency will need to be allocated to this contract prior to completion, as SFMTA has identified an additional *$31.3 million* in potential contract changes to the 1300 Contract in its trend log.**

Table 2 - Contract, Budget, and Trends for Active Construction Projects[1]

	1252 – Tunnel	1300 Stations, STS
Original Contract	233,584,015	839,676,400
Approved Contingency	2,329,485	40,000,000
Extra Budget for Non-Project Costs	6,173,508	
Approved Budget	235,913,500	879,676,400
Approved Changes	1,494,770	7,085,813
Current Contract (1252 does not include non-project costs)	235,078,785	846,762,213
Remaining Contingency	834,715	*32,914,187*
Potential Changes (Trends)	170,654	*28,740,279*
Estimate at Completion	235,249,439	*875,502,492*
Contingency Less Trends	664,061	*4,173,908*
Spent to Date	233,793,900	*478,788,136*
Potential Left to Spend	1,455,539	*396,714,356*
Contingency Less Trends as % of Potential Cost to Complete	45.6%	*1.1%*

[1] *As reported in the April 2017* Central Subway Project Monthly Progress Report – SFMTA (reformatted by the PMOC).

Table 3 shows the overall budget, trends, and contingency status for the entire Central Subway program. **The total contingency, including unallocated contingency and subtracting identified trends, represents *10.0%* of the potential remaining spending, which, in the**

opinion of the PMOC, should be sufficient to provide reasonable confidence in an on-budget completion of the project.

Table 3 - Budget and Contingency Status for Central Subway Project

SFMTA Central Subway Project, Budget, Costs and EAC by SCC January 31, 2017		FFGA Budget	Budget Transfers	Current Budget = Committed	Change	Base Budget	Contingency	Expenditures to Date		Remaining Budget	Cost to Complete	Estimate at Completion	Budget Forecast Variance
		$	$	$	%	$	$	$	%	$	$	$	$
10	**Guideway and Track Elements**	**315,926,081**	**(30,698,202)**	**285,227,879**	**-10%**			**223,871,339**	78%	**61,356,540**			
10.02	Guideway: At Grade, Semi-exclusive	2,395,143	464,857	2,860,000	19%			382,500	13%	2,477,500			
10.06	Guideway: Underground cut and cover	74,407,195	(4,590,788)	69,816,407	-6%			62,168,677	89%	7,647,730			
10.07	Guideway: Underground tunnel	224,933,257	(23,592,511)	201,340,746	-10%			155,878,646	77%	45,462,100			
10.09	Track: Direct fixation	7,293,157	(532,068)	6,761,089	-7%			2,822,916	42%	3,938,173			
10.10	Track: Embedded	1,601,763	(1,601,763)	-	-100%			-	0%	-			
10.12	Track: Special	5,295,566	(845,929)	4,449,637	-16%			2,618,600	59%	1,831,037			
20	**Stations, Stops, Terminals, Intermodal**	**432,698,735**	**154,938,209**	**587,636,944**	**36%**			**329,969,366**	56%	**257,667,578**			
20.01	At-grade station	774,913	6,827,944	7,602,857	881%			1,432,988	19%	6,169,869			
20.02	Aerial station, stop, shelter, mall, terminal, platform		3,124,033	3,124,033	NA			-	0%	3,124,033			
20.03	Underground station	412,084,888	143,123,329	555,208,217	35%			324,650,530	58%	230,557,687			
20.07	Elevators, escalators	19,838,934	1,862,903	21,701,837	9%			3,885,848	18%	17,815,989			
40	**Sitework and Special Conditions**	**232,551,627**	**(18,613,257)**	**213,938,370**	**-8%**			**195,720,732**	**91%**	**18,217,638**			
40.01	Demolition, clearing, earthwork	8,887,028	3,468,587	12,355,615	39%			11,623,680	94%	731,935			
40.02	Site utilities, utility relocation	29,562,587	30,586,986	60,149,573	103%			63,476,165	106%	(3,326,592)			
40.03	Haz. Material, contam'd soli removal, ground water treatment	2,957,442	4,494,779	7,452,221	152%			4,674,185	63%	2,778,036			
40.04	Environmental mitigation	3,146,216	(2,023,317)	1,122,899	-64%			619,100	55%	503,799			
40.05	Site structures, including retaining walls, sound walls	2,894,074	(187,643)	2,706,431	-6%			2,706,431	100%	-			
40.06	Pedestrian and bike access and accommodation, landscaping	14,393,910	(4,602,915)	9,790,995	-32%			2,421,454	25%	7,369,541			
40.07	Automobile, van, bus accessways, including roads and parking lots	11,919,550	(5,340,451)	6,579,099	-45%			3,534,414	54%	3,044,685			
40.08	Temporary facilities and other construction indirect costs	158,790,820	(45,009,283)	113,781,537	-28%			106,665,303	94%	7,116,234			
50	**Systems**	**108,429,774**	**(13,184,464)**	**95,245,310**	**-12%**			**24,952,069**	**26%**	**70,293,241**			
50.01	Train control and signals	37,447,116	(9,415,693)	28,031,423	-25%			7,284,419	26%	20,747,004			
50.02	Traffic signals and crossing protection	3,013,232	9,549,297	12,562,529	317%			9,394,880	75%	3,167,649			
50.03	Traction power supply	20,379,634	1,085,439	21,465,073	5%			6,667,077	31%	14,797,996			
50.04	Traction power distribution	16,239,951	(3,798,838)	12,441,113	-23%			1,423,189	11%	11,017,924			
50.05	Communications	28,545,305	(16,514,719)	12,030,586	-58%			182,503	2%	11,848,083			
50.06	Fare collection system and equipment	2,804,536	3,295,464	6,100,000	118%			-	0%	6,100,000			
50.07	Central Control		2,614,586	2,614,586	NA			1	0%	2,614,585			
Subtotal (10 - 50)		**1,089,606,217**	**92,442,286**	**1,182,048,503**	**8%**	**1,146,079,601**	**35,968,902**	**774,513,506**	**66%**	**407,534,997**	**400,477,029**	**1,174,990,535**	**7,057,968**
60	**ROW, Land, Existing Improvements**	**37,398,029**	**(5,151,708)**	**32,246,321**	**-14%**	**32,246,321**	**-**	**30,731,521**	**95%**	**1,514,800**	**1,514,800**	**32,246,321**	**-**
60.01	Purchase or lease of real estate	33,798,029	(3,732,219)	30,065,810	-11%	30,065,810	-	28,322,091	94%	1,743,719	1,514,800	29,836,891	228,919
60.02	Relocation of existing households and businesses	3,600,000	(1,419,489)	2,180,511	-39%	2,180,511	-	2,409,430	110%	(228,919)	-	2,409,430	(228,919)
70	**Vehicles**	**26,385,653**	**-**	**26,385,653**	**0%**	**13,309,000**	**13,076,653**	**2,147,782**	**8%**	**24,237,871**	**11,161,218**	**13,309,000**	**13,076,653**
70.01	Light Rail Vehicles	26,385,653	-	26,385,653	0%	13,309,000	13,076,653	2,147,782	8%	24,237,871	11,161,218	13,309,000	13,076,653
80	**Professional Services**	**361,568,360**	**(32,829,240)**	**328,739,120**	**-9%**	**310,518,041**	**18,221,079**	**251,586,663**	**77%**	**77,152,457**	**58,931,379**	**310,518,042**	**18,221,078**
80.01	Preliminary Engineering	46,317,094	**(114,420)**	46,202,674	0%	46,202,674	-	46,202,675	100%	(1)	-	46,202,675	(1)
80.02	Final Design	86,053,240	(24,734,909)	61,318,331	-29%	61,318,331	-	61,199,308	100%	119,023		61,322,751	(4,420)
80.03	Project Management for Design and Construction	191,025,800	(88,107,411)	102,918,389	-46%	89,012,544	13,905,845	67,682,823	66%	35,235,566	26,422,550	94,105,373	8,813,016
80.04	Construction Administration and Management	15,495,521	78,558,172	94,053,693	507%	91,096,881	2,956,812	64,952,034	69%	29,101,659	21,002,018	85,954,052	8,099,641
80.05	Professional Liability and Other Non-Construction Insurance	6,800,000	-	6,800,000	0%	6,800,000	-	6,340,196	93%	459,804	78,370	6,418,566	381,434
80.06	Legal, Permits, Review Fees by Other Agencies	7,242,340	970,264	8,212,604	13%	8,212,604	-	4,377,921	53%	3,834,683	3,421,207	7,799,128	413,476
80.07	Surveys, Testing, Investigation, Inspection	234,036	699,064	933,100	299%	933,100	-	831,706	89%	101,394	1,858	833,564	99,536
80.08	Start up	8,400,329	(100,000)	8,300,329	-1%	6,941,907	1,358,422	-	0%	8,300,329	7,881,932	7,881,932	418,397
Subtotal (10 - 80)		**1,514,958,258**	**54,461,339**	**1,569,419,597**	**4%**	**1,502,152,963**	**67,266,634**	**1,058,979,472**	**67%**	**510,440,125**	**472,084,426**	**1,531,063,898**	**38,355,699**
90	Unallocated Contingency	63,341,742	(54,461,340)	8,880,402	-86%		8,880,402		0%	8,880,402			8,880,402
Total Project Costs (10 - 100)		**1,578,300,000**	**(1)**	**1,578,299,999**	**0%**		**76,147,036**	**1,058,979,472**	**67%**	**519,320,527**	**472,084,426**	**1,531,063,898**	**47,236,101**

SCC Breakdown of Forecast Construction Costs Not Available

[2]Data reported in the *April 2017* Central Subway Project Monthly Progress Report – SFMTA (reformatted by the PMOC)

Change Order Control

SFMTA continues to estimate that additional CMods with a net increase in contract value of $170,654 will be executed as part of contract close out for the 1252 Contract. Based on the expected final contract value, change orders for the base work are forecast to represent less than 1% of the original contract amount. This represents exceptionally good change order control compared to typical capital projects.

SFMTA is maintaining its management tools for tracking potential contract changes for the 1300 Contract. *The latest CN1300 Trend Summary is dated June 7, 2017. This report shows that 68 contract modifications have been approved (four additional CMods since May 3) for a net increase in the contract value of $7,245,928. CORs (generated by the contractor) that have been determined to have merit and PCCs (generated by SFMTA) have a combined expected value of $31,303,030 in increased contract value, an increase of $4.53 million since May 3. An additional 596 items are being tracked in the Trend Log with a net value of $27.80 million in possible contract value increases. Of these, 281 have been judged by SFMTA to be without merit, but are being carried at a reduced value in the trend to address potential future claims. A further 255 items have been voided and are carried at no cost. There are 46 items covered by certified claims and notices of potential claims by the contractor ($14.09 million total exposure, $780,000 greater than last month), and 14 items are "open" or "new" and awaiting a determination of merit.*

The most recent version of the Trend Summary shows a total potential increase in contract cost of $66,344,376 including the $7.25 million in contract cost increases executed thus far. The total estimated cost impact of the identified trends increased by about $5.85 million from May 3, 2017 to June 7, 2017. Much of the increase in potential cost exposure is due to a claim for extra costs associated with an alleged delay to the Thales train control contract (claimed at $2 million) and extra costs to add sidewalk bulb-outs at the intersections of 4th Street with Harrison and Bryant streets (estimated at $1.5 million).

The following trend items with potential cost increases in excess of $250,000 are identified in the Trend Log:

1. TS and SL changes for STS - $298,307
2. Change to grade 50 steel from specified grade 70 steel (due to availability issues) - $572,884
3. Extra trucking costs for contaminated soil at CTS - $2,274,225
4. Harder rock than anticipated for CTS slurry wall excavation - $2,820,600
5. Delays to installation of tangent piles at UMS - $1,082,380
6. UMS Garage underpinning requirements - $732,157
7. 12-inch waterline at UMS, added scope - $336,236
8. Utility conflicts with sewer line installation at UMS - $744,465

9. Changes in construction sequence for UMS Garage - $500,000
10. UMS art glass installation requirements - $382,978
11. Obstructions to jet grout placement at UMS - $2,062,420
12. Change in track switch machine manufacturer at STS - $391,909
13. Additional monitoring instruments at CTS - $429,777
14. Extra work to prepare existing tunnel - $431,423
15. Additional traffic control requirements at 4th and King - $675,001
16. Incomplete interface design at STS - $300,001
17. Additional traffic control requirements for STS work package - $1,032,302
18. Cost of changes to the design of CTS to accommodate the plaza requested by the community - $4,618,428
19. Change in vent for emergency generator at all stations - $500,001
20. Missing conduit between manholes at UMS - $250,001
21. Contractor-claimed change in contract requirements for pre-loading permanent struts at UMS - $1,853,352
22. Soil nail and shotcrete wall changes in Union Square Garage - *$1,337,776 (up from $1,187,172)*
23. Contractor claim that wayside signals are extra - $1,512,373
24. Change in drain piping details at UMS - $332,252
25. Temporary drainage at Union Square Garage ramps - $292,754
26. Change in automatic train control system for reverse running - $400,001
27. Design changes for UMS vertical drainage slots - $866,709
28. Costs associated with differing site conditions for Level 3 Duct Bank - $2,400,001
29. Claim for extra costs and time due to extremely hard ground claimed by TPC during the coring for the SEM mining work - *$862,720 (up from $750,000)*
30. Escalator raceways at UMS - $492,065
31. Change in design for BART entrance elevator at UMS - $400,000
32. *Extra costs for SEM excavation at CTS due to tunnel segments being 5 feet wide - $4,404,329 (up from $3,750,000)*
33. *Extra costs due to concrete obstruction at CTS south platform cavern - $583,623 (new)*
34. Time impacts due to power pole conflict during demolition at CTS - $3,516,164
35. Time impacts from extended submittal reviews and substitution request procedures - $3,021,262

36. Claimed delays to SEM work at the platform invert due to compensation grout exclusion zone requirements in the contract specifications - *$900,889 (up from $800,000)*
37. *Estimated extra costs of proposed scope increase to provide sidewalk bulb-outs at 4th and Bryant and 4th and Harrison - $1,500,000 (new)*
38. *Claimed extra costs for a schedule delay to the train control subcontract - $2,000,000 (new)*
39. *Claimed extra costs for delays to the CTS south platform center drift excavation - $450,000 (new)*

The PMOC is concerned that several new large change order requests have been issued in the past 2 months, which may indicate a negative trend for project cost control.

In addition to these large potential cost increases, the Trend Log includes the following major cost savings:

1. Deletion of compensation grouting bid items at YBM - ($1,833,869)
2. Deletion of the Air Replenishment System (ARS) - ($4,689,000)

Funding and Expenditures

Federal, state, and local project funding and expenditures are shown in Table 4. The awarded funding now represents 84.3% of the project budget.

Table 4 - Project Funding

Source	Committed ($1,000)	Awarded ($1,000)
Federal		
New Starts	942,200	769,196
Congestion Mitigation	41,025	41,025
Federal Subtotal	983,225	810,221
State		
TCRP	14,000	14,000
State RIP	88,000	12,498
Prop. 1B / PTMISEA	307,792	307,792
Prop. 1A / HSR	61,308	61,308
State Subtotal	471,100	395,598
Local		
Prop. K Sales Tax	123,975	123,975
Local Subtotal	123,975	123,975
Project Total:	**1,578,300**	**1,329,794**

E. PROJECT SCHEDULE STATUS

SFMTA prepared a master program schedule update in May representing progress on the project through April 2017. SFMTA has added details for start-up and testing activities to the program schedule. The contractor has submitted revised schedule updates through April 2017,

which are under review by SFMTA. The February and March 2017 schedule updates were returned to the contractor with comments. Schedule updates by the contractor are being submitted and reviewed by SFMTA in accordance with an agreement reached as a result of DRB review of the schedule-related disputes between SFMTA and TPC.

In the opinion of the PMOC, using the DRB was an effective means of achieving agreement between SFMTA and the contractor regarding schedule updates. The parties should continue to use the partnering process and the DRB as resources for resolving project issues. Resolution of the issues regarding contractor schedule updates is an important achievement that provides a firm basis for realistic and reliable project schedule evaluation. An agreed project schedule from the contractor will be critical to the evaluation and agreement on schedule recovery strategies.

The PMOC remains concerned that unresolved responsibility for the accumulated delays to date is hindering SFMTA and TPC from working together to identify schedule mitigation measures. SFMTA has initiated discussions with TPC regarding long-standing delay claims and has provided a formal proposal regarding the time allowance for one of the oldest claims (delayed removal of a power pole at CTS). *TPC disputes the amount of delay allowed by SFMTA and has issued a claim for the additional delay they consider to be warranted.* SFMTA reported that it intends to take the issue regarding the delays associated with a PG&E power pole at CTS to the DRB in the coming months.

SFMTA and TPC are now holding weekly meetings to resolve the outstanding schedule delay issues. **In the opinion of the PMOC, SFMTA should finalize the time impact allowances on the remaining contractor delay claims as soon as possible so that SFMTA and the contractor can focus on the current schedule issues. SFMTA and the contractor should make appropriate use of the partnering and DRB processes to facilitate resolution of any disputes regarding allowable time impacts.**

The April master program schedule update indicates that the projected RSD slipped 26 days during the month. The critical path for the construction work continues to flow through the construction of CTS, but analysis by the PMOC indicates that there are a total of four lines of work that are influencing the RSD for the project. *The projected RSD forecast is now December 10, 2019, nearly 12 months later than planned.* There is negative float on the project critical path, and further delays to the RSD are virtually certain based on the progress of work on the critical path.

The contractor has been working two 12-hour shifts and 6 days per week at CTS in an attempt to reduce the impacts of lower than planned production rates for the ongoing SEM mining work for the platform cavern. *The planned work productivity for the month of April was not achieved, causing the further slip in the projected RSD. The contractor started excavation of the crossover cavern in May, substantially earlier than the originally planned start of this work. However, SFMTA does not expect a substantial schedule benefit of the early start of this work.*

Table 5 shows the latest BHAGs and the status for each work package in the 1300 Contract.

Table 5 - Interim BHAGs for CTS Construction Progress

Milestone	Target Date	Actual Date	*Status*
CTS			
Complete platform cavern excavation	*Delayed from June 15, 2017 to September 1, 2017*	*May 22, 2017*	*This is a 78-day delay in the target date for this BHAG, which involves critical path work*
Start crossover cavern excavation	May 15, 2017		*Achieved*
UMS			
Complete station box excavation	June 1, 2017		*Needs updating*
Complete utilities at Ellis	April 15, 2017		*BHAG missed, completion date not shown on schedule.*
Complete utilities at Geary	June 30, 2017		*On track*
Complete utilities at O'Farrell	July 31, 2017		*On track*
YBM			
Complete invert slab for station box	*April 15, 2017*	*May 16, 2017*	*1 month late*
Complete invert slab for headhouse	*April 30, 2017*	*May 17, 2017*	*17 days late*
STS			
Complete all utility work along 4th Street	*May 31, 2017 south of Bryant* *July 15, 2017 through 4th and Bryant intersection*		*BHAGs will be missed* *Need updates*

The PMOC convened a schedule containment workshop for the project on June 22 and 23, 2016. The PMOC's analysis of the schedule at that time indicated that four lines of work were driving project completion to be later than the December 2018 planned RSD:

- CTS work leading to tunnel electrical power and Advanced Train Control System (ATCS) testing;
- STS work (Radiax, Train Control and Software) leading to ATCS testing;
- CTS work leading to building start-up and testing; and
- UMS work leading to building start-up and testing.

Improvements needed be made in the overall durations of each of these lines of work in order to move the RSD earlier than the projected date, presuming that the ongoing schedule slippage at CTS could be arrested. *Unfortunately, the schedule slippage for the work at CTS has continued and the projected RSD has slipped almost 5 months since the workshop. Much of the schedule slippage has occurred in the past 4 months of the project.*

In the opinion of the PMOC, although setting and working toward the short term milestones may be encouraging cooperation and collaboration between TPC and SFMTA in advancing the current work, this practice *has been ineffective in arresting the ongoing schedule slippage. In order to establish an achievable RSD, the time required to complete the*

remaining SEM work at CTS must be determined based on realistically achievable production rates that reflect the actual conditions for this work. To determine whether any time savings for the subsequent work are possible, a **comprehensive view of the lines of work that are driving the RSD must be taken by SFMTA. Efforts must be made to improve the work sequence and advance elements of the testing and commissioning activities near the end of the project in order to improve the RSD.** ***SFMTA has started to engage its Transit Division in planning the testing and commissioning work. Coordination between the CSP and SFMTA's operations management should continue with the objective of establishing a firm schedule for commissioning and start-up activities.***

SFMTA agreed to several action items that will lead to an updated schedule and projection of likely RSD outcomes (see Table 8). The PMOC notes that SFMTA *has completed* an update of the RAP including a more detailed schedule of testing, commissioning, and start-up activities as part of the 2017 update of the PMP.

The potential for schedule recovery can be evaluated with more confidence after the completion of the SEM work for the platform cavern and after mining work for the crossover cavern has been underway for a few weeks. Information on the likely progress rate for the crossover cavern excavation can be used to project a completion date for the SEM work at CTS, which is on the project critical path. ***Based on the BHAG for the platform cavern completion and the expected start date for the crossover cavern, the PMOC will hold another schedule recovery workshop in July 2017.***

Project Schedule Data

Earned Value (EV): $*1,039,972,892, an increase of $8.09 million from March.*

Planned Value (PV): *$1,370,178,677, a planned increase of $18.24 million from March.*

Schedule Performance Index (SPI): 0.76. SPI greater than 1 is ahead of schedule and less than 1 is behind schedule. SFMTA has identified the minimum acceptable SPI to be 0.90; the current SPI indicates unacceptable schedule performance.

SPI is a measure of schedule efficiency on a project. It is the ratio of earned value to planned value. An SPI equal to or greater than 1 indicates more work was completed than planned and a value of less than 1 indicates less work was completed than planned. A value of equal to or greater than 0.9 reflects satisfactory performance, considering the margin of error in estimating both earned value and planned value. The current value of 0.76 indicates that the project is significantly behind schedule**.**

Table 6 shows the status of the schedule milestones established for the project.

Table 6 - Schedule Milestones

	(P = Planned Date, A = Actual Date, F = Forecast Date)
Preliminary Engineering (PE):	Authorized in July 2002 (A)
Record of Decision:	Issued November 26, 2008 (A)
Final Design (FD):	Authorized in January 2010 (A)
FFGA Request:	Submitted September 2011 (A)
FFGA Executed:	October 11, 2012 (A)
Ground Breaking: (Utility Relocation Contract)	February 9, 2010 (A)
Tunnel excavation complete (hole through):	June 2, 2014 (SB); June 11, 2014 (NB) (A)
Cross passages complete:	December 20, 2014 (P); April 15, 2015 (A)
Tunneling substantial completion:	April 15, 2015 (A)
Station construction Notice to Proceed (NTP):	June 17, 2013 (A)
Station construction substantial completion:	February 24, 2018 (P); *June 26, 2019* (F)
RSD:	December 26, 2018 (P); *December 10, 2019* (F)

Schedule Contingency Management criteria were developed from the FTA Risk Assessment prior to entry into Final Design (FD). Minimum schedule contingency levels at various project milestones or "Hold Points" were agreed to with SFMTA at Risk Workshop #4, held on February 24 through 27, 2009. The FTA recommended schedule contingency for the current stage of the project is 6.0 months. As noted above, the current schedule reflects *nearly 12 months* of negative buffer float.

Critical Path Summary *(Baseline Schedule)*

CTS Install Guidewalls, Slurry Walls, and Install Surface Deck (complete)
CTS Excavate Headhouse and Bracing (complete)
CTS SEM and Install Supports (underway)
CTS Headhouse Structural Concrete/Remove Bracing
CTS Install Mechanical, Electrical, and Plumbing (M/E/P) Equipment
CTS Start-up and Testing
CTS P-1254R Commissioning of Station
Safety and Security Certification/Pre-Revenue Activities
RSD on December 26, 2018 (currently forecast *December 10, 2019*)

Three Month Look-ahead

The following activities are planned over the next 3 months:

1300 Contract

UMS

Complete utility placement, backfill, and paving of Ellis Street

Install guardrails and prepare the new vehicle ramps at Union Square Garage for use by the public

Complete waterproofing and lightweight concrete fill at plaza level of Union Square Garage

Complete the fan-level structure in the Union Square Garage area

Continue excavation and placement of struts and walers in the station box

Complete *removal of* the tunnel liner in the station box

Complete construction of access shaft at O'Farrell Street

Complete the invert in the Ellis Street Annex area

CTS

Continue excavation of the station platform caverns

Continue excavation of the crossover cavern as fill-in work

Continue structural work in the north egress shaft and final lining of the egress tunnel

Provide compensation grouting as needed

YBM

Begin bottom-up construction of the headhouse

Continue M/E/P rough-in and place topping slabs at the mezzanine and concourse levels

Start interior wall construction and M/E/P rough-in at the platform level

Complete utilities in 4th Street above the station box and restore street pavement

STS

Sewer installation

Waterline installation

Alternative Water Supply System (AWSS) installation

Muni duct bank installation

Continue street restoration and final paving

Start installation of tunnel lighting

Installation of overhead contact system support poles and light poles

Placement of tunnel walkways

Begin staging of track and track welding in the 4th Street median

Continue installation of track invert slab in the station areas

The PMOC expects to attend the following meetings:

- Weekly Management (*July 10, July 31, and September 11)*
- Weekly Contract 1300 Construction Progress Meetings (*July 11/12, August 1/2, September 12/13*)
- Weekly Configuration Management Board (CMB) *(July 12, August 2, September 13)*
- CSP Risk Management Meetings (August 3, September 14*)*
- CSP PMOC Status meetings on *July 13, August 1, and September 12*
- FTA/QPRM scheduled for *August 3, 2017*

F. QUALITY ASSURANCE AND QUALITY CONTROL

QA/QC Plan Implementation

The 1300 contractor's staff includes a Contractor's Quality Manager (CQM), who reports to the Contractor's Management at an organization level superior to the contractor's Project Manager. The CQM is provided by a subcontractor. The reporting structure is to provide the CQM with direct access to the contractor's Principal Officers. A Contractor Non-conformance Report (CNCR) Log for identifying, correcting, documenting, and controlling non-conformances is maintained by the contractor and reviewed at weekly status meetings for each work package. Subsequent work may not progress for work that is the subject of a Corrective Action Request (CAR) until conditions averse to quality are corrected. In the event that the contractor does not issue a CNCR, SFMTA may issue a Non-conformance Notice (NCN) where non-conforming work is identified by SFMTA's quality assurance staff.

Construction crew attention to quality has been consistent, with the occurrence of critical non-conforming work being infrequent. The quality concerns for the 1300 Stations Contract identified in the SFMTA *April* monthly report were largely unchanged from the previous month and included:

- As is typical to similar projects, work performed prior to receipt of approval status of required submittals/RFIs with/without knowledge of QC remains a potential area of concern.
- TPC's Record Document (as-built) development, including CNCRs and a timely record of work performed that is different than what is required by the latest approved Conformed Design Drawings, needs improvement. Quality Assurance Surveillance QAS076 was conducted, posted to CM13, and provided to TPC for their action. The Quality Assurance Surveillance followed findings from a Quality Assurance Audit provided to TPC for corrective action in January of 2016. The audit identified some lack of conformance to the requirements of the Record Document Specification Section 01 78 39. *The findings have been issued to TPC for response. In general, SFMTA believes that TPC is working to address the identified concerns.*
- Revisions of and adherence to the required process for identifying, documenting, and implementing requirements for support of excavation as the SEM work progresses at CTS. Daily meetings are held to review the planned work for the upcoming shifts to assure that the

proper excavation support and sequencing are implemented. SFMTA reports that TPC is meeting these requirements in a "most acceptable manner."

- *Deterioration of the Sequential Excavation Method and Construction Monitoring Task Force meetings, where the resolution of technical issues is being hindered by "contractual bickering."*

As of June 6, 2017, 294 CNCRs had been filed by TPC's Quality Manager (4 more than in early April), 9 new items were under review, 34 other items had responses identified but not yet approved, the proposed responses to 9 items were disapproved, and 22 items had approved responses that were not yet implemented. In addition, 183 items were closed and 37 items had been voided. None of the open or disapproved items is delaying progress of the work.

G. AMERICANS WITH DISABILITIES ACT (ADA) COMPLIANCE

There are no ADA issues for the project at this time.

H. SAFETY AND SECURITY

Safety and Security Management Plan

An updated SSMP Revision 2, dated February 2, 2014, was submitted to FTA on May 2, 2014. The SSMP outlines the plans needed prior to revenue operations. These plans include the RAP, the System Integration Test Plan, the Safety and Security Certification Plan (SSCP), and the Pre-Revenue Operations and Start-up Plan. SFMTA has completed the SSCP, which is being used to guide safety certification activities. The initial draft of the RAP was completed with the latest update of the PMP. The System Integration Test Plan and the Pre-Revenue Operations and Start-up Plan are expected to be provided with the next PMP update.

Fire and Life Safety/Safety and Security Issues

The Construction Specification Conformance Checklists have been completed and approved for all construction packages. In September 2013, the CPUC staff began attending monthly as-built meetings to review the completed items. All items related to the tunnel construction have been certified and accepted by SFMTA's safety staff. The certification work will begin to address the station construction items in 2016. The San Francisco Fire Department (SFFD) regularly attends the now combined FLSC and SSCRC meetings. The SFFD will continue to coordinate with the Stations Construction Project to identify issues of importance during construction.

Construction Safety

The 1300 Contract is maintaining an excellent safety record, with a total of six recordable and four lost time incidents since the project start. *No recordable incidents occurred in the month of April 2017.* The performance metrics relating to accidents per working hour are well below the OSHA goals for similar construction. The current accident records for the 1300 Contract are shown in Table 7.

Table 7 - Construction Safety Data

Through April 2017	No. of Incidents	Incident Rate[1]	Goal
1300 Contract			
OSHA Recordable Accidents	6	*0.56*	<3.4
Job Transfer/Restricted Duty Incidents	0	0	NA
Lost Time Incidents	1	*0.09*	<1.6
Total Incidents	7	*0.65*	NA
Hours Worked	*2,157,024*		

[1]OSHA incident rate = incidents x 200,000/hours worked.

I. PROJECT RISK, RISK MANAGEMENT, AND RISK MITIGATION

RCMP Revision 3 was received by the PMOC on April 30, 2013. The outgoing PMOC provided its final Spot Report to FTA on July 19, 2013. SFMTA submitted a CSP "Contingency Management – Schedule 2012 Update" on May 22, 2013. SFMTA provided a further update of the schedule risk assessment in June 2015 that recommended a reduction of the minimum schedule contingency after demobilization of the tunnel work to 4.0 months. The updated risk assessment was conducted on the approved baseline schedule for the 1300 Contract without updates to reflect the then current status of the construction work and the accumulated construction delays.

The Contract 1300 baseline schedule was adopted in early December 2014. Schedule updates completed by the contractor have been rejected by SFMTA due to logic errors and have not been incorporated into the master program schedule. SFMTA has prepared its own revision of the construction schedule and is using updates to that schedule to maintain the master program schedule. SFMTA is continuing to refine the record of as-built construction activity incorporated in the master schedule. The schedule risk assessment update is now expected from the CSP after the schedule tool in P6 is further enhanced and a recovery schedule is produced. The risk assessment would be conducted to determine a range of likely actual RSDs based on the updated schedule, possible recovery of accumulated delays, and remaining schedule risks. The timing of the risk assessment will be determined in the coming months.

The most recent Risk Mitigation Meeting attended by the PMOC was the June 8, 2017 Risk Mitigation Meeting for the CSP, which included a review of the status of the top risks ranked "6" or above and several other risks that had not been updated recently. The PMOC noted the following significant items of discussion:

- The risk of damage to structures in the CTS construction area due to settlement and subsequent failure of utilities remains. *SFMTA noted that settlement monitoring devices have*

detected slight settlement of utility lines above the platform cavern excavation zone. Corresponding settlement of the street surface has not been detected. SFMTA is evaluating responses to the measured settlement, including assessing what amount of settlement could be sustained without high risk of damage to the utility lines. SFWD still has not yet installed gate valves on the two major water mains that traverse the construction zone. *The work was due to be completed in June.* These valves are intended to facilitate quick shut-off of water in the event that one of the water lines fails, thereby preventing collateral damage due to water intrusion.

- Two risks related to delays in testing, commissioning, and system start-up have been partially mitigated through preparation of a more detailed RAP and accompanying schedule of testing and start up activities. SFMTA issued the updated RAP in April. Muni operations is now reviewing and is expected to provide comments on the RAP. The schedule for testing needs additional logic ties to construction work completion. At present, no testing work is shown to start before May 2019. Testing work can likely start sooner at YBM, as that station construction will be completed earlier than the other two stations. *The discussion regarding risks associated with start-up and testing activities being delayed revealed that active discussions are underway between the CSP program and Muni operations regarding the required activities and the schedule for completion. In the opinion of the PMOC, beginning the planning for start-up activities well in advance of the completion of construction should support effective planning and implementation of the testing and start-up activities.*

- *As part of the discussion regarding potential delays to CSP caused by other SFMTA projects, SFMTA noted that delays to the system-wide train control system upgrade program might impact CSP's schedule. It also was noted that the train control system provider, Thales, has issued a schedule delay claim for its work on CSP, and that there have been numerous changes in the Thales management team. SFMTA is concerned that Thales may not have sufficient management and technical resources to complete the SFMTA work it has under contract in a timely fashion. In the opinion of the PMOC, it will be important to monitor progress on the design and delivery of the transit control system for CSP.*

- The risk of being unable to recover schedule delays has occurred. All parties agree that the planned RSD of December 2018 will not be achieved. Mitigation strategies will now focus on establishing an achievable completion date for construction and RSD and then aggressively managing to achieve the revised dates. The revised RSD (to be expressed as a range of dates) will be identified through the PMOC-facilitated schedule workshop *now planned for late July.*

- The risk of SEM excavation leading to settlement and damage to adjacent buildings has been experienced, *and compaction grouting was undertaken. The settlement of the buildings along Stockton Street at the CTS construction site was arrested and some of the settlement was recovered. Monitoring of buildings will continue as excavation proceeds.*

- The risk of delays due to coordination with the construction of the hotel at 4th and Clementina streets remains low. The remaining major work to complete in Clementina is

installation of the electrical supply box by PG&E, which will need to follow utility work for the hotel. *It appears that the planned July opening date for the hotel may be missed.*

In the opinion of the PMOC, the risk mitigation meeting continues to be an effective forum for identifying threats to the success of the CSP and for developing mitigation measures to reduce the threats, although some risks, such as schedule-related risks, are impacting the project's performance. The project team continues to engage in meaningful discussions during the risk mitigation meetings that help focus attention on the most important issues that could affect project cost, quality, and the completion schedule.

A list of the top risks discussed at the June 2017 Risk Mitigation Meeting is included in Appendix D.

J. ACTION ITEMS

Table 8 on the following page shows the current action items for SFMTA.

Table 8 - SFMTA Action Items for Central Subway Project

Category	NO.	ACTION	DATE OPENED	DUE DATE	DATE CLOSED	COMMENTS
S	**165**	Develop recovery schedule.	12/10/15	*8/17/17*		After schedule workshop.
S, RA	**166**	Update schedule risks based on recovery schedule.	12/10/15	*9/20/17*		Assume that risks will be updated 30 days after completion of schedule workshop.
S	**169**	Review and address logic errors and acceleration strategies in the schedule.	6/23/16	*8/17/17*	Ongoing evaluation	Finalize logic changes based on schedule workshop recommendations.
S	**171**	Provide a range of dates for the Revenue Start Date.	6/23/16	*9/3/17*		Based on results of schedule workshop.
CH	**174**	Revise trend tracking process to include the amount of time that has passed since the trend was originally identified.	3/24/17	*TBD*		
CH, S	**175**	SFMTA to finalize the time impact allowances on the remaining contractor delay claims as soon as possible so that SFMTA and the contractor can focus on the current schedule issues.	3/24/17	*TBD*		

(Note: All closed items are removed a month after being closed. Changes to open items since last update are indicated in *italics.*)

Category Key:
C – Cost
FMP – Fleet Management Plan
IRP – Independent Review Panel
PMP –Project Management Plan
QA – Quality Assurance
RA – Risk
RE – Real Estate
S – Schedule
SC – Scope
SS – Safety
T – Tech. Cap. & Cap.
CH – Change Mgmt.

APPENDIX A. LIST OF ACRONYMS

AC	Actual Cost
ADA	Americans with Disabilities Act
APTA	American Public Transportation Association
ARE	Assistant Resident Engineer
ARS	Air Replenishment System
ATCS	Advanced Train Control System
AWSS	Alternative Water Supply System
BART	Bay Area Rapid Transit
BCE	Baseline Cost Estimate
BHAG	Big Hairy Audacious Goal
BRT	Bus Rapid Transit
Caltrans	California Department of Transportation
CAR	Corrective Action Request
CFR	Code of Federal Regulations
CLIN	Contract Line Item Number
CMB	Configuration Management Board
CMod	Contract Modification
CNCR	Contractor Non-Conformance Report
COR	Change Order Request
CPI	Cost Performance Index
CPUC	California Public Utilities Commission
CQM	Contractor's Quality Manager
CSP	Central Subway Project
CTS	Chinatown Station
DF	Designated Function
DRB	Dispute Review Board
EV	Earned Value
FD	Final Design
FEIR	Final Environmental Impact Report
FEIS	Final Environmental Impact Statement
FFGA	Full Funding Grant Agreement
FLSC	Fire and Life Safety Committee
FMP	Fleet Management Plan
FRA	Federal Railroad Administration
FTA	Federal Transit Administration
IRP	Independent Review Panel
LONP	Letter of No Prejudice
LRT	Light Rail Transit
LRV	Light Rail Vehicle

M/E/P	Mechanical, Electrical, and Plumbing
MMRP	Mitigation Monitoring Reporting Program
MOU	Memorandum of Understanding
MPS	Master Project Schedule
Muni	Common Public Reference to SFMTA
NCN	Non-conformance Notice
NCR	Non-conformance Report
NEPA	National Environmental Policy Act
NTP	Notice to Proceed
O&M	Operations & Maintenance
OHA	Operational Hazard Analysis
OP	Oversight Procedure
PCC	Proposed Contract Changes
PE	Preliminary Engineering
PG&E	Pacific Gas & Electric Company
PHA	Preliminary Hazard Analysis
PMOC	Project Management Oversight Contractor
PMP	Project Management Plan
PTMISEA	Public Transportation Modernization, Improvement, and Service Enhancement Account
PV	Planned Value
QA/QC	Quality Assurance/Quality Control
QPRM	Quarterly Progress Review Meeting
QTR	Quarter
RAMP	Real Estate Acquisition Management Plan
RAP	Rail Activation Plan
RCMP	Risk and Contingency Management Plan
RE	Resident Engineer
RFI	Request for Information
ROD	Record of Decision
RSD	Revenue Service Date
SBE	Small Business Enterprise
SCIL	Safety Certifiable Item List
SCP	Safety Certification Plan
SEIS	Supplemental Environmental Impact Statement
SEM	Sequential Excavation Method
SEPP	Security and Emergency Preparedness Plan
SFDPW	San Francisco Department of Public Works
SFFD	San Francisco Fire Department
SFMTA	San Francisco Municipal Transportation Agency

SFPUC	San Francisco Public Utilities Commission
SFWD	San Francisco Water Department
SIT	Systems Integration Test
SOP	Standard Operating Procedure
SPI	Schedule Performance Index
SSCP	Safety and Security Certification Plan
SSCRC	Safety and Security Certification Review Committee
SSCVR	Safety and Security Certification Verification Report
SSMP	Safety and Security Management Plan
SSO	State Safety Oversight
SSP	System Security Plan
SSPP	System Safety Program Plan
STS	Surface, Track, and Systems
TBD	To Be Determined
TBM	Tunnel Boring Machine
TPC	Tutor Perini Corporation
TSA	Transportation Security Administration
TVA	Threat and Vulnerability Analysis
U.S.C.	United States Code
UMS	Union Square/Market Street Station
VRF	Variable Refrigerant Flow
YBM	Yerba Buena/Moscone Center Station
YOE	Year of Expenditure

APPENDIX B. SAFETY AND SECURITY CHECKLIST

Central Subway Project Overview			
Project mode (Rail, Bus, BRT, Multimode)	Light Rail Transit		
Project phase (Preliminary Engineering, Design, Construction, or Start-up)	Construction		
Project Delivery Method (Design/Build, Design/Build/ Operate/Maintain, CM/GC, etc.)	Design-Bid-Build		
Project Plans	*Version*	*Review by FTA/FRA*	**Status**
Safety and Security Management Plan	**2014**	**2011**	Revision 1 Update submitted to FTA 02/25/2011. Not submitted to FRA. Revision 2 submitted to FTA on May 2, 2014.
Safety and Security Certification Plan (SSCP)	**2011**		SSCP was revised 10/2011. Revision 1 was developed in November 2011. Not submitted to FRA.
System Safety Program Plan (SSPP)	**2009**	**2009**	SSPP dated 03/13/2009 submitted to FTA 07/31/2009. Not submitted to FRA.
System Security Plan (SSP) or Security and Emergency Preparedness Plan (SEPP)	**2009**		Not submitted to FTA. Not submitted to FRA.
Construction Safety and Security Plan	**2012**		Health and Safety. Construction Safety Standards Revision 3, June 27, 2012.
Safety and Security Authority	*Y/N*		**Notes/Status**
Is the grantee subject to 49 CFR Part 659 state safety oversight requirements?	Y		
Has the state designated an oversight agency as per Part 659.9?	Y		California Public Utilities Commission (CPUC) Consumer Protection & Safety Division 505 Van Ness Avenue San Francisco, CA 94102 (415) 703-1017 phone (415) 703-1758 fax Point of contact: Arun Mehta

Central Subway Project Overview			
Project mode (Rail, Bus, BRT, Multimode)	Light Rail Transit		
Project phase (Preliminary Engineering, Design, Construction, or Start-up)	Construction		
Project Delivery Method (Design/Build, Design/Build/ Operate/Maintain, CM/GC, etc.)	Design-Bid-Build		
Project Plans	*Version*	*Review by FTA/FRA*	**Status**
Has the oversight agency reviewed and approved the grantee's SSPP as per Part 659.17?	Y		SFMTA currently operates its LRT system in compliance with an SSPP approved by the CPUC. These plans will be revised, as required, to incorporate the addition of the CSP during the late construction and early testing phase and submitted to the CPUC for approval prior to the planned start of revenue operations.
Has the oversight agency reviewed and approved the grantee's Security Plan or SEPP as per Part 659.21?	Y		See above.
Did the oversight agency participate in the last Quarterly Program Review Meeting?	Y		
Has the grantee submitted its safety certification plan (SCP) to the oversight agency?	Y		SFMTA submitted the SSCP to CPUC staff for review and Commission approval during the preliminary engineering phase. The plan was approved in March 2009. The SSCP revised in November 2011 was submitted to the CPUC and was approved.
Has the grantee implemented security directives issues by the Department Homeland Security, Transportation Security Administration?	N/A		Currently, there are no TSA directives or programs applicable to the project. If any arise during the course of the project, the activities to comply will be developed and shown on a revision of the project safety and security activities schedule.
SSMP Monitoring			
Is the SSMP project-specific, clearly demonstrating the scope of safety and security activities for this project?	Y		The PMOC reviewed the CSP SSMP and provided a spot report to FTA in May 2011. FTA approved the CSP SSMP on May 16, 2011. A follow-up Adherence Audit was conducted September 14-16, 2011. The audit found that CSP is conducting its activities in accordance with the SSMP.

Central Subway Project Overview			
Project mode (Rail, Bus, BRT, Multimode)	Light Rail Transit		
Project phase (Preliminary Engineering, Design, Construction, or Start-up)	Construction		
Project Delivery Method (Design/Build, Design/Build/ Operate/Maintain, CM/GC, etc.)	Design-Bid-Build		
Project Plans	*Version*	*Review by FTA/FRA*	**Status**
Grantee reviews the SSMP and related project plans to determine if updates are necessary?	Y		SSMP Revision 2 was submitted to FTA on May 2, 2014.
Does the grantee implement a process through which the Designated Function (DF) for Safety and DF for Security are integrated into the overall project management team? Please specify.	Y		Safety and security are under the direction of the SFMTA Safety and Security Manager and supplemented by Project Management/Construction Management consultant staff, including a Safety and Security Certification professional who has been dedicated to supervise project Safety and Security Certification.
Does the grantee maintain a regularly scheduled report on the status of safety and security activities?	Y		Safety and security certification status and activities are reported in the weekly construction progress meetings and the CSP Monthly Progress Report.
Has the grantee established staffing requirements, procedures, and authority for safety and security activities throughout all project phases?	Y		
Does the grantee update the safety and security responsibility matrix/organizational chart as necessary?	Y		The PMOC found the revised matrix in the SSMP, Rev. 1, 02/08/11, to be compliant.
Has the grantee allocated sufficient resources to oversee or carry out safety and security activities?	Y		
Has the grantee developed hazard and vulnerability analysis techniques, including specific types of analysis to be performed during different project phases?	Y		CSP has prepared a Preliminary Hazard Analysis Report, Rev. 0, April 23, 2009. Corrective actions and analysis for different project phases have been identified in the report.

Central Subway Project Overview			
Project mode (Rail, Bus, BRT, Multimode)	Light Rail Transit		
Project phase (Preliminary Engineering, Design, Construction, or Start-up)	Construction		
Project Delivery Method (Design/Build, Design/Build/ Operate/Maintain, CM/GC, etc.)	Design-Bid-Build		
Project Plans	*Version*	*Review by FTA/FRA*	**Status**
Does the grantee implement regularly scheduled meetings to track to resolution any identified hazards and/or vulnerabilities?	Y		
Does the grantee monitor the progress of safety and security activities throughout all project phases? Please describe briefly.	Y		Safety and Security is an ongoing agenda item on the current construction contract (1300).
Does the grantee ensure the conduct of preliminary hazard and vulnerability analyses? Please specify analyses conducted.	Y		
Has the grantee ensured the development of safety design criteria?	Y		Design is complete and construction is underway.
Has the grantee ensured the development of security design criteria?	Y		Design is complete and construction is underway.
Has the grantee ensured conformance with safety and security requirements in design?	Y		Certification checklists are developed and certified through monthly meetings. Design is complete and construction is underway.
Has the grantee verified conformance with safety and security requirements in equipment and materials procurement?	Y		Safety and Security Conformance checklists have been prepared for each of the construction contracts. All certifiable elements of the Tunnel work have been certified and accepted by SFMTA Safety. *Certification reviews are underway for the stations contract.*
Has the grantee verified construction specification conformance?	Y		This is on-going as construction progresses.
Has the grantee identified safety and security critical tests to be performed prior to passenger operations?	N		Currently being developed.

Central Subway Project Overview			
Project mode (Rail, Bus, BRT, Multimode)	Light Rail Transit		
Project phase (Preliminary Engineering, Design, Construction, or Start-up)	Construction		
Project Delivery Method (Design/Build, Design/Build/ Operate/Maintain, CM/GC, etc.)	Design-Bid-Build		
Project Plans	*Version*	*Review by FTA/FRA*	**Status**
Has the grantee verified conformance with safety and security requirements during testing, inspection, and start-up phases?	N		Project is in construction, with RSD more than 2.5 years in the future.
Does the grantee evaluate change orders, design waivers, or test variances for potential hazards and/or vulnerabilities?	Y		
Has the grantee ensured the performance of safety and security analyses for proposed work-arounds?	N/A		Currently no work-arounds have been identified.
Has the grantee demonstrated through meetings or other methods, the integration of safety and security in the following: ☐ Activation Plan and Procedures ☐ Integrated Test Plan and Procedures ☐ Operations and Maintenance Plan ☐ Emergency Operations Plan	*In Process*		*Second draft of Rail Activation Plan has been completed.* An Integration Matrix has been implemented for all disciplines including safety and security concerns.
Has the grantee issued final safety and security certification?	N		Project is in the construction phase.
Has the grantee issued the final safety and security verification report?	N		Project is in the construction phase.
Construction Safety			
Does the grantee have a documented/implemented Contractor Safety Program with which it expects contractors to comply?	Y		Health and Safety Construction Safety Standards Revision 3, June 27, 2012.

Central Subway Project Overview			
Project mode (Rail, Bus, BRT, Multimode)	Light Rail Transit		
Project phase (Preliminary Engineering, Design, Construction, or Start-up)	Construction		
Project Delivery Method (Design/Build, Design/Build/ Operate/Maintain, CM/GC, etc.)	Design-Bid-Build		
Project Plans	*Version*	*Review by FTA/FRA*	**Status**
Does the grantee's contractor(s) have a documented companywide safety and security program plan?	Y		
Does the grantee's contractor(s) have a site-specific safety and security program plan?	Y		The remaining active contractor has a plan. Contract documents require that the contractor follows an Environmental Health and Safety Program, specific to the contract work.
Provide the grantee's OSHA statistics compared to the national average for the same type of work?	Y		Provided in the Central Subway Monthly Progress Report.
If the comparison is not favorable, what actions are being taken by the grantee to improve its safety record?	N/A		Statistics are favorable. No action is needed.
Does the grantee conduct site audits of the contractor's performance versus required safety/security procedures?	Y		Safety walks are routinely conducted at each construction site.
Federal Railroad Administration			
If shared track: has grantee submitted its waiver request application to FRA? (Please identify specific regulations for which waivers are being requested.)	N/A		No shared track. No waivers are anticipated.
If shared corridor: has grantee specified specific measures to address shared corridor safety concerns?	N/A		
Is the CHA underway?	N/A		
Other FRA required Hazard Analysis – Fencing, etc.?	N/A		

Central Subway Project Overview			
Project mode (Rail, Bus, BRT, Multimode)	Light Rail Transit		
Project phase (Preliminary Engineering, Design, Construction, or Start-up)	Construction		
Project Delivery Method (Design/Build, Design/Build/ Operate/Maintain, CM/GC, etc.)	Design-Bid-Build		
Project Plans	*Version*	*Review by FTA/FRA*	**Status**
Does the project have Quiet Zones?	N		
Does FRA attend the Quarterly Review Meetings?	N		

N/A = Not applicable.

APPENDIX C. PROJECT MAP AND OVERVIEW

CENTRAL SUBWAY PROJECT: Project Overview and Map

Date:	*June 9, 2017*
Project Name:	Central Subway Project (CSP) New Starts Light Rail Transit
Grantee:	San Francisco Municipal Transportation Agency (SFMTA)
FTA Regional contact:	Mr. Jeffrey S. Davis
FTA Headquarters contact:	Ms. Kim Nguyen

Scope

Description:	The CSP will extend the Third Street Light Rail line from the Caltrain station at Fourth and King streets to Chinatown. It was incorporated in the FEIS/FEIR on the Third Street Light Rail project published in December 1998, but FTA did not include the CSP in the Record of Decision (ROD) issued in March 1999. A ROD for the CSP, however, was issued by FTA on November 26, 2008, and the U.S. Department of Transportation and FTA determined that the requirements of the National Environmental Policy Act (NEPA) of 1969 were satisfied for the CSP. The environmental record for the CSP is included in the Final Supplemental Environmental Impact Statement (SEIS), Volume II, dated July 11, 2008 and the Final SEIS, Volume I, dated September 23, 2008. These documents present the detailed statement required by NEPA and U.S.C. 5324 (b). SFMTA requested authority to enter Preliminary Engineering (PE) in March 2002 and submitted a Project Management Plan (PMP) in June 2002. FTA approved entry into PE in July 2002. Approval to enter Final Design (FD) was granted by FTA on January 7, 2010. The Full Funding Grant Agreement (FFGA) was signed on October 11, 2012.
Guideway:	The length of the CSP will be 1.7 miles of double-tracked line.
Stations:	The CSP includes three subway stations and one surface station.
Additional Facilities:	The CSP does not include any ancillary facilities.
Vehicles:	The CSP Service Plan dated October 2009 clarified that four vehicles will be required.
Ridership:	43,521 Average Weekday Boardings are projected in 2030.

Schedule

07/02	Approval Entry to PE	2016	Estimated Rev Ops at Entry to PE
01/10	Approval Entry to FD	2018	Estimated Rev Ops at Entry to FD
10/11/12	FFGA	2018	Estimated Rev Ops at FFGA
12/10/2019			Revenue Operations Date at date of this report

65.9% *Percent Complete Based on Progress* (*April 2017 data*)

Cost

$764 million	Total Project Cost ($YOE) at Approval Entry to PE
$1,578 million	Total Project Cost ($YOE) at Approval Entry to FD
$1,578 million	Total Project Cost ($YOE) at FFGA signed
$TBD million	Total Project Cost ($YOE) at Revenue Operations
$1,578 million	Total Project Cost ($YOE) at date of this report including $0.00 in Finance Charges
$1,059.0 million	Amount of Expenditures at date of this report from Total Project Budget of $1,578 million
67.1%	Percent Complete based on Expenditures at date of this report
$8.88 million	Unallocated Contingency remaining
$76.15 million	Total Project Contingency (allocated and unallocated contingency as reported by CSP)
$60 million	Minimum Total Project Contingency revised on September 5, 2012 PMOC review of Contingency Management Plan

	AT HOLD POINTS	QTR	Minimum Contingency Levels	Revised Levels
1A	Hold Point 1a – Tunnels 100% designed February 2011 (Actual)	1Q11	280	280
1B	Hold Point 1b – CTS 100% designed June 2012 (Actual)	4Q11	250	240
1C	Hold Point 1c – 40% Bid (Tunnel and CTS)	2Q12	225	200
1D	Hold Point 1d – FFGA Award October 2012 (Actual)	3Q12	-	180
2	Hold Point 2 – Commence CTS / UMS construction (Actual June 17, 2013)	2Q13	160	160
3	Hold Point 3 – Demobilize Tunnels *(Actual April 15, 2015)*	*2Q15*	140	140
4	Hold Point 4 – Stations to platform levels (CTS / YBM) November 2016	4Q16	60	60
5	Hold Point 5 – Complete CTS / Tunnels systems inst. April 2018	2Q18	25	25
RSD	PMOC / FTA RSD	4Q19		
CURRENT TOTAL CONTINGENCY $76.15 Million				


central T subway
Lombard St.
COIT TOWER
Columbus Ave.
Washington Square Park
Union St.
TUNNEL ONLY - NO SERVICE
Broadway
Broadway Tunnel
The Embarcadero
Washington St.
Ferry Building
T CHINATOWN
Stockton St.
Kearny St.
Montgomery St.
Battery St.
EMBARCADERO
California St.
Leavenworth St.
Bush St.
Post St.
FUTURE TRANSBAY TERMINAL
FOLSOM
MONTGOMERY
UNION SQUARE/ MARKET STREET
J K L M N T
Market St.
1st St.
N
Mission St.
2nd St.
Howard St.
Harrison St.
Folsom St.
BRANNAN
POWELL
Golden Gate St.
4th St.
I-80
YERBA BUENA/ MOSCONE
5th St.
3rd St.
2ND ST. AND KING
CIVIC CENTER
7th St.
6th St.
4TH ST. AND BRANNAN
King St.
AT&T BALLPARK
4TH AND KING/BERRY N T
Bryant St.
Brannan St.
Townsend St.
Caltrain
MISSION ROCK
UCSF
UCSF MISSION BAY
LEGEND
T Third Phase 2
T Third Phase 1
Muni Metro
Caltrain
BART

APPENDIX D. TOP PROJECT RISKS

The Project Risk Register was updated in 2016. Top risks *and selected risks that had not been reviewed in several months* were discussed at the June 2017 meeting as noted below.

Top Risks Discussed in the Previous Month:

#52 – The risk of settlement of older utilities above the CTS cross-cut cavern and platform cavern excavations. The ground above and near the excavation is extensively instrumented, and daily meetings are being held to review the recorded data from the instruments. *Some settlement of subsurface utilities has been detected.* Gate valves have yet to be installed on the water lines above the excavation. These will allow immediate shut-off of water in the event of a failure in one of the lines or ground settlement that could damage the lines and cause a leak. SFMTA is negotiating the cost of these valves with SFWD.

#205 – The risk that the prolonged process for approval and execution of CMods results in bad blood between SFMTA and the contractor. CMods are now being processed more quickly and the backlog of unresolved changes is being reduced. SFMTA continues to try and streamline the CMod process. The parties are meeting twice weekly to advance negotiations.

#229 – Risk that acceptance testing takes longer than planned, resulting in delays to the RSD. A more detailed schedule for testing is included in the updated RAP. Some testing may be advanced at YBM, as that station will be completed earlier than the other subway stations.

#230 – Insufficient time for Muni operations involvement in commissioning results in delays and an impact to the RSD. Muni operations and management are reviewing the RAP. CSP staff to confirm that commissioning schedule is sufficient and that Muni can provide required staff.

#232 – Unable to recover accumulated delays, resulting in late RSD. This risk has occurred and the RSD is very likely to be delayed. This also remains the top risk, as further delays are likely. Mitigation measures underway were discussed. A schedule containment workshop will be held in July 2017.

#234 – This risk that the contractor's proposed alternative SEM excavation method would cause subsidence will continue to be monitored until all SEM operations are completed. Closely related to risk #52. Settlement that is occurring is within the expected range *and compensation grouting has been completed to arrest the settlement.*

#238 – This risk is that the Quality Program may be ineffective in processing the nonconformance issues causing schedule impacts. The process of tracking and processing the Non-conformance Reports (NCR) through improved tracking logs is continuing. The CNCR log is being updated as appropriate. CNCRs are being identified timely and processed appropriately. The rating of this risk has been reduced.

#240 – This risk that unresolved assignment of schedule delay responsibility may lead to increased cost continues. SFMTA and the contractor are working on schedule updates and on

resolution of the causes for schedule delays that have occurred. Efforts continue to focus on how to reduce the accumulated delays. This risk is closely related to #232.

#244 – Risk of delays due to coordination of construction with work a 254 4th Street. Coordination is ongoing and the risk of delays is low. Major coordination remaining is for utilities in Clementina Street.

#246 – Risk that design changes are not captured in the as-built record drawings for the project. TPC is doing a good job of preparing as-built drawings as the construction is proceeding. CSP's QA program includes reviews to assure that all changes are captured in the drawings.

#104 – Risk that CPUC approval of the project grade crossings takes longer than planned. This risk continues, as there is stall an issue with SFMTA's standard cross-buck signage for crossings. The issues should be resolved through an official update of Muni's standard operating procedures and approval of the update by CPUC.

#PR 78 – Risk that delays to other projects cause delays to the CSP RSD. *It was noted that system-wide train control work could impact CSP. Additionally, the CSP train control subcontractor has issued a delay claim.*

#227 – Risk that LRV operator training requirements cause delays to system opening. CSP has begun coordination with Muni operations regarding system start-up including operator and other training requirements and schedules.

#228 – Barn sign-up timing results in delays to RSD. CSP has identified the barn sign-up process in its program schedule.

APPENDIX E. ROADMAP TO REVENUE OPERATIONS

Roadmap to Revenue Operations - Central Subway Project, San Francisco Municipal Transportation Agency – DRAFT				
Description	**Estimated Start Date**	**Estimated Completion Date**	**Actual Completion Date**	**Notes**
Testing				
Finalize/update Systems Integration Test (SIT) Plan	TBD	TBD	TBD	Project is in construction, with RSD *2+* years in the future.
Prepare Schedule for Testing	*1/1/2017*	TBD	TBD	*Initial testing, commissioning, and start-up schedule has been completed.*
Finalize Test Procedures	TBD	TBD	TBD	Project is in construction, with RSD *2+* years in the future.
Conduct System Integrated Testing with trains, including procedures and reports	TBD	TBD	TBD	Project is in construction, with RSD *2+* years in the future.
Complete Testing Reports	TBD	TBD	TBD	Project is in construction, with RSD *2+* years in the future.
Operating Plan, Rules, and Training				
Finalize Operating Plan	TBD	TBD	TBD	Project is in construction, with RSD *2+* years in the future.
Finalize/revise SOPs, manuals, and rulebook as applicable	TBD	TBD	TBD	Project is in construction, with RSD *2+* years in the future.
Operations Manuals	TBD	TBD	TBD	Project is in construction, with RSD *2+* years in the future.
Staffing and Operations Plan	TBD	TBD	TBD	Project is in construction, with RSD *2+* years in the future.
Training of O&M personnel	TBD	TBD	TBD	Project is in construction, with RSD *2+* years in the future.
Emergency response plan, training, and drills	TBD	TBD	TBD	Project is in construction, with RSD *2+* years in the future.
Vehicle Maintenance Plan, Equipment, Facilities, and Training				
Rail Fleet Management Plan	TBD	TBD	TBD	

Roadmap to Revenue Operations - Central Subway Project, San Francisco Municipal Transportation Agency – DRAFT				
Description	**Estimated Start Date**	**Estimated Completion Date**	**Actual Completion Date**	**Notes**
Maintenance Schedules and Procedures	TBD	TBD	TBD	The LRV fleet is being replaced and expanded through a separate project. The CSP requires an expansion of the fleet of four vehicles.
Spare Parts Requirements	TBD	TBD	TBD	The LRV fleet is being replaced and expanded through a separate project. The CSP requires an expansion of the fleet of four vehicles.
Maintenance Manuals	TBD	TBD	TBD	The LRV fleet is being replaced and expanded through a separate project. The CSP requires an expansion of the fleet of four vehicles.
Maintenance Training	TBD	TBD	TBD	The LRV fleet is being replaced and expanded through a separate project. The CSP requires an expansion of the fleet of four vehicles.
Facility and Right-of-way Maintenance Plan, Equipment, Facilities, and Training				
Maintenance Schedules and Procedures	TBD	TBD	TBD	Project is in construction, with RSD 2+ years in the future.
Spare Parts Requirements	TBD	TBD	TBD	Project is in construction, with RSD 2+ years in the future.
Maintenance Manuals	TBD	TBD	TBD	Project is in construction, with RSD 2+ years in the future.
Maintenance Training	TBD	TBD	TBD	Project is in construction, with RSD 2+ years in the future.
Pre-Revenue Operations				
Finalize and/or update RAP and/or Pre-Revenue Operations Plan	4/2/2015	TBD	TBD	*The second draft with additional detail and a schedule for testing and pre-revenue activities has been submitted with the 2017 update of the PMP.*
Implement Rail Activation Committee	TBD	TBD	TBD	Project is in construction, with RSD 2+ years in the future.
Shadow operations	NA	NA	NA	*Project will be operated by the established MUNI operations division.*

Roadmap to Revenue Operations - Central Subway Project, San Francisco Municipal Transportation Agency – DRAFT				
Description	**Estimated Start Date**	**Estimated Completion Date**	**Actual Completion Date**	**Notes**
Develop/revise SSPP & Security Plan (approved by SSO)	*Ongoing*	10/31/2015	10/31/2015	CPUC triennial review conducted in October 2015 concluded that SFMTA "has a comprehensive System Safety Program Plan (SSPP) and has made significant progress in executing that plan."
FTA Office of Safety & Security Readiness Review	TBD	TBD	TBD	Project is in construction, with RSD 2+ years in the future.
PMOC OP-54 Readiness for Revenue Operations Review Report, Phase I	TBD	TBD	TBD	Project is in construction, with RSD 2+ years in the future.
Conduct Operational Hazard Analysis (OHA) and resolve other hazards/ vulnerabilities	TBD	TBD	TBD	Project is in construction, with RSD 2+ years in the future.
Pre-Revenue Operations	TBD	TBD	TBD	Project is in construction, with RSD 2+ years in the future.
Public Outreach				
Develop Safety Outreach Plan	TBD	TBD	TBD	Project is in construction, with RSD *2+* years in the future.
Provide Community Outreach	TBD	TBD	TBD	Project is in construction, with RSD *2+* years in the future.
Grand Opening Plan	TBD	TBD	TBD	Project is in construction, with RSD *2+* years in the future.
Construction Close Out				
Close Out of Non-Conformance Reports	Ongoing	*09/02/2019*	TBD	NCRs are tracked and closed prior to follow-on work. Final closure of NCRs expected as of final completion date of 1300 Contract.
Punch List Complete	12/17/2018	*09/02/2019*	TBD	Punch list completion expected at final completion of 1300 Contract.
Certificates of Occupancy/Substantial Completion	TBD	*06/05/2019*	TBD	

Roadmap to Revenue Operations - Central Subway Project, San Francisco Municipal Transportation Agency – DRAFT				
Description	**Estimated Start Date**	**Estimated Completion Date**	**Actual Completion Date**	**Notes**
Safety, Security, and Fire-life Safety Certifications				
Update/Finalize SSMP			2/18/2014	Revision 2 completed.
Finalize and/or update SCIL and SSCP			10/10/2008	Revision 0.
Implement Safety and Security Certification Committee			8/1/2010	Committee meets monthly to review certifiable items.
Implement Fire Life Safety Committee			8/1/2010	
Preliminary Hazard Analysis (PHA)				Need dates.
Threat and Vulnerability Analysis (TVA)				Need dates.
Design Criteria Reflecting Safety and Security Requirements	NA	NA	NA	Design is complete and construction is underway.
Review status of quality non-conformances	Ongoing	*09/06/2019*	TBD	
Close Out of non-safety critical items	Ongoing	Ongoing	TBD	
Close Out of safety critical items	Ongoing	Ongoing	TBD	
Complete Safety & Security Certification Verification Report (SSCVR)	TBD	*09/15/2019*		60 days before RSD - Check against latest regulations.
Document Workarounds/Open Items List	TBD	TBD	TBD	
Verify emergency drills, tabletops, training, etc. are completed	TBD	TBD	TBD	
State Safety Oversight (SSO) final certification/signature	TBD	*10/24/2019*		21 days before RSD - Check against latest regulations.
Third Party and Agency Agreements				
Third Party/Agency Agreements Necessary for Revenue Service	TBD	TBD	TBD	Project is in construction, with RSD *2+* years in the future.
Third Party/Agency Approvals Necessary for Revenue Service	TBD	TBD	TBD	Project is in construction, with RSD *2+* years in the future.

Roadmap to Revenue Operations - Central Subway Project, San Francisco Municipal Transportation Agency – DRAFT				
Description	**Estimated Start Date**	**Estimated Completion Date**	**Actual Completion Date**	**Notes**
Revenue Service				
Target Revenue Service Date	-	*12/10/2019*		Current forecast RSD. Recovery schedule to be prepared.
FFGA Revenue Service Date	-	12/23/2018		

APPENDIX F. LESSONS LEARNED

LL#	Date	Phase	Category	Subject	Lesson Learned
1	09-30-10	FD	Management	Consultant Contracts	The project must have a full understanding of the agency and other approving governmental authorities to avoid delay of contract approval and consequential delay of the Master Project Schedule (MPS).
2	09-30-10	FD	Cost	Staffing Plan	The project staffing plan needs to be formulated during PE and updated at least quarterly during FD to manage Standard Cost Category 80 costs and monitor design production.
3	09-30-10	FD	Scope	Letter of No Prejudice (LONP)	A defined scope of grantee and PMOC responsibilities needs to be provided for content and acceptability of LONP requests.
4	09-30-10	FD	Management	SSMP	FD consultants should be trained, shortly after mobilization, in the format and their responsibility regarding the System Safety Consultant.
5	10-30-10	FD	Cost	Baseline Cost Estimate (BCE) Update	The BCE should be updated with current costs as soon as they are known by the project to allow mitigation of cost contingency usage.
6	02-21-12	FD	Management	Program Controls	Program Controls system/software selected for use for the duration of the project should be in place and functional prior to approval to enter FD. Doing so will avoid a transition during FD that could create a lag in timely reporting of cost and schedule status.
7	02-21-12	FD	Management	Risk Mitigation	Oversight Procedure (OP) 40 needs to be revised to establish minimum requirements for secondary mitigation at different phases of the project, similar to those for cost and schedule contingency. The PMOC recommends 5% of project cost at Entry into FD and 3% at execution of an FFGA.

LL#	Date	Phase	Category	Subject	Lesson Learned
8	02-21-12	FD	Scope	Third Party Agreements	All third party agreements need to be identified as soon as possible, but no later than 65% design completion. This includes leases, both temporary and permanent; MOUs; and licenses, specifically for preconstruction property surveys and settlement monitoring instruments (especially important for underground construction). These third party agreements need to be secured no later than the advertisement date of the construction that they affect. Third party agreements need to be tracked by the project continuously, reported monthly, and updated in a third party agreement matrix submitted quarterly to FTA.
9	02-21-12	FD	Cost	Cost Estimating Procedures	During the preliminary design phase, the project should establish the cost estimating procedures, format, and software to be used by all estimating entities for the entire duration of the project.
10	02-21-12	FD	Cost	Allocated Cost Contingency	In the BCE submitted to FTA for Entry into FD, the project should identify percentages of allocated cost contingency contained in the BCE that are apportioned for design risk, market risk, and construction risk.
11	02-28-12	FD	QA	Design Management Action Log	Design Management should develop a matrix as a tracking tool to document, track, and close out known elements that are missing from design submission packages.
12	08-15-12	FD	Environmental Mitigations	MMRP	Numerous mitigations identified in the MMRP are to be handled by incorporating specific design details and/or statements in the contract drawings and technical specifications. The grantee should note on the MMRP the relevant drawings and/or technical specifications.

LL#	Date	Phase	Category	Subject	Lesson Learned
13	08-31-12	FD	Management	Risk Contingency Levels and Hold Points	It became apparent, during the monitoring of the cost contingency drawdown curve for the project that the contingency levels and hold points no longer represented the current stage of project development and risk reduction/contingency usage related to project development. The project advanced through 100% project design; however, the project did not receive credit for the cost contingency usage established by the risk model. The PMOC recognized this deficiency and participated with the grantee in developing a cost contingency drawdown that reflects current project development and reduced risk.
14	06-30-13	Const.	Management	Change Order Process	Perform an audit of the project's procedures related to Change Orders and processing. The project should train staff and inform contractor of their obligations in the process.
15	1-30-14	Const.	Management	Independent Review Panel (IRP) Decision-makers	At the request of SFMTA, the American Public Transportation Association (APTA) formed a panel of geotechnical and tunnel experts to perform a peer review of the BART Undercrossing. Prior to crossing under the BART tunnels, the Independent Review Panel (IRP), contractor, SFMTA, and BART representatives convened at predetermined tunnel boring machine (TBM) locations to discuss the TBM progress and determine whether the tunneling should proceed. It is critical that decision makers from each organization attend these meetings. It was noted that BART Senior Management did not attend and instead deferred decisions to lower level staff.
16	6-30-14	Const.	Bid documents	Pre-Classification for Soil and Groundwater Disposal	Soils and groundwater generated from construction activities should be pre-classified with appropriate sampling and testing required by potential disposal facilities. Coordinate with the disposal facilities to get materials accepted.

LL#	Date	Phase	Category	Subject	Lesson Learned
17	4-10-15	Const.	Quality Control/Safety	Monitoring of Soil Conditions during Underground Construction	There was a breach of the excavation of frozen ground during construction of a cross passage between the twin bored tunnels followed by water and soil flowing into the tunnels, resulting in subsidence of the ground above and damage to underground utilities. Apparently the flow of materials into the tunnels went on for quite some time before the problem was detected and actions could be taken to arrest the flow. The construction site was not staffed when the breach started and there was no external warning system in place to notify the contractor or the agency of the condition. When the safety and structural integrity of a construction site depends on maintain soil conditions with the use of mechanical systems, the site should be continuously staffed or monitoring devices at the site should be continuously monitored from a remote location to assure that the expected soil conditions are maintained.
18	4-10-15	Const.	Environmental	Archeological Data Recovery Protocols	Sensitive archeological materials were uncovered during the excavation of the roof area at YBM. The Program Manager took immediate action to notify the appropriate state officials and implemented protocols for protection of the materials. The most likely descendent of the remains was quickly identified and a representative was engaged and brought to the site to supervise the ongoing excavation. The quick action to involve the appropriate parties resulted in satisfactory handling of the artifacts with minimal delays to the construction schedule.

LL#	Date	Phase	Category	Subject	Lesson Learned
19	5-11-15	Const.	Quality Control	Use of Latest Design Information for Field Inspection	After two roof pours were completed, it was discovered that required reinforcing steel was missing. Changes to the arrangement of the reinforcing steels were made as part of the submittal review and response process. Notes from the designer were included on the approved shop drawings but not in the contract design drawings. Field inspectors were using only the design drawings to confirm the proper installation of reinforcing steel prior to concrete placement. In the future, the latest design information, including submittals and related designer notes, will be used to inspect reinforcing steel prior to concrete placement.
20	9-28-15	Const.	Schedule	Maintenance of Updated Construction Schedule and Master Program Schedule	SFMTA was unable to obtain an acceptable baseline schedule from the station construction contractor for over a year. Then, SFMTA could not obtain acceptable updated status schedules from the contractor for another 8 months. As a result, the construction status and completion date could not be accurately determined for the first 20 months of the contract. This made schedule control impossible. SFMTA finally created its own schedule updates for the first 12 months of the construction contract using the pay applications and 4-week look-ahead schedules from the contractor. Lesson learned – owners should aggressively assert the need for accurate schedule updates from contractors and should withhold payment if such updates are included in the contract terms or specifications and are not forthcoming. If schedule updates are not received within the first few months of the project, the owner should create its own updates for the purpose of progress monitoring and schedule control.

LL#	Date	Phase	Category	Subject	Lesson Learned
21	11-30-15	Const.	Construction Planning	Installation of Special Trackwork in Operating Systems	SFMTA needed to install special trackwork to provide the connection to the new alignment for Central Subway portion the T Third LRT line. The original plan was to install the special trackwork at the intersection in eight extended weekend shutdowns. Working with the contractor, the plan was revised to accomplish the necessary trackwork installations in two shutdowns. After considering the outcome of the first shutdown, where a portion of the special trackwork did not fit properly and needed adjustment during the shutdown, SFMTA decided to pre-assemble the second, more complex, special trackwork assembly at an off-site facility. The assembly was completed and the resulting track was surveyed to confirm the geometry and to assure that the assembly would fit into the existing field conditions. While conducting the assembly and disassembly of the track components, the contractor identified an approach that would reduce the time required to reassemble the trackwork in the field. As a result of the pre-planning and assembly of the complex trackwork, the final assembly was completed without the need for field adjustments and in less time than planned. This was an effective approach to mitigate the risks associated with the installation of complex custom track components in an operating transit line.
22	3-1-17	Const.	Legal/Claims	Preparation for Mediation	A contractor for advance utility relocation issued a multi-million-dollar claim for extra costs due to delays and unforeseen conditions. SFMTA believed the claim had no justification. After several years, the claim was referred for mediation prior to going to trial. The contractor made a very compelling presentation regarding the extra costs. However, due to careful preparation by SFMTA management, the agency was able to provide specific and detailed rebuttals to the contractor's major arguments. The mediation resulted in a settlement for less than 15% of the original claim amount. SFMTA chose to accept the settlement amount, recognizing that the costs to pursue the claim in court would likely exceed the settlement value.

APPENDIX G. CONTRACT STATUS

The following sections provide the status of ongoing contracts associated with the CSP. Note that the DBE participation percentages are updated by SFMTA on a quarterly basis. The current values are through March 2017.

Contract No.	**1250**	
Contract Description:	**UR #1 (YBM)**	
Status:	Completed June 2011.	
Cost:	Original Contract Value	$9,273,939
	Approved Change Orders	$2,694,211
	Current Contract Value	$11,968,150
	Expended to Date	$11,968,150
	% Expended	100%
	SBE Participation	97%
Schedule:	NTP issued January 2010. Substantial completion in June 2011.	
Issues or Concerns:		

Contract No.	**1251**	
Contract Description:	**UR #2 (UMS)**	
Status:	Work is complete.	
Cost:	Original Contract Value	$16,832,550
	Approved Change Orders	$3,962,031
	Current Contract Value	$20,794,581
	Expended to Date	$20,794,581
	% Expended	100%
	SBE Participation	87%
Schedule:	NTP issued January 2011. Substantial completion in August 2012.	
Issues or Concerns:	Final total cost claim by contractor has been settled.	

Contract No.	**1252**	
Contract Description:	**Tunnels**	
Status:	Final completion achieved. Financial close out underway.	
Cost:	Original Contract Value	$233.58 million
	Approved Change Orders	$8.26 million
	Current Contract Value	$241.84 million
	Expended to Date	$234.88 million; $6.2 million is paid from non-project funds
	% Expended	97.1%
	SBE Participation	5.8%
Schedule:	Final completion achieved May 15, 2015.	
Issues or Concerns:	None.	

Contract No.	**1277**	
Contract Description:	**Pagoda Palace Demolition**	
Status:	Construction is complete; contract is in close out.	
Cost:	Original Contract Value	$498,995
	Approved Change Orders	$149,981
	Current Contract Value	$648,976
	Expended to Date	$648,976
	% Expended	100%
	SBE Participation	100%
Schedule:		
Issues or Concerns:	None.	

Contract No.	**1300**	
Contract Description:	**Three subway stations (YBM, UMS, and CTS) and STS**	
Status:	Mass excavation complete at one station and well underway at two other stations.	
Cost:	Original Contract Value	*$839.68 million*
	Approved Change Orders	*$7.05 million*
	Current Contract Value	*$846.72 million*
	Expended to Date	*$472.93 million*
	% Expended	*55.9%*
	SBE Participation	*1804%*
Schedule:	NTP issued June 17, 2013. Substantial Completion planned February 10, 2018 and *forecast June 2019.*	
Issues or Concerns:	The work on this contract is behind schedule.	

Contract No.	**CS-155-1**	
Contract Description:	**Design Package 1 for Contracts 1250, 1251, and 1252. PB/Telemon**	
Status:	Design is complete. Construction support is nearly complete for Contract 1252.	
Cost:	Original Contract Value	$5,795,000 (includes exercised options)
	Approved Change Orders	$2,145,159
	Current Contract Value	$7,940,159
	Expended to Date	$7,937,601
	% Expended	*100.0%*
	SBE Participation	30.2%
Schedule:		
Issues or Concerns:		

Contract No.	**CS-155-2**	
Contract Description:	**Design Package 2 for UMS, CTS, and YBM. CSDG prime**	
Status:	Designs are complete for all of the station contracts. Construction support of Contract 1300 is underway.	
Cost:	Original Contract Value	*$34,228,038*
	Approved Change Orders	*$1,626,722*
	Current Contract Value	*$35,854,760*
	Expended to Date	$35,207,277
	% Expended	*98.2%*
	SBE Participation	*36.7%*
Schedule:		
Issues or Concerns:		

Contract No.	**CS-155-3**	
Contract Description:	**Design Package 3 for STS. HNTB-B&C Prime**	
Status:	Design is complete. Construction support of Contract 1300 is underway.	
Cost:	Original Contract Value	$16,822,238
	Approved Change Orders	$312,814
	Current Contract Value	$17,232,252
	Expended to Date	*$14,163,416*
	% Expended	*81.9%*
	SBE Participation	*26.7%*
Schedule:		
Issues or Concerns:		

Contract No.	**CS-149**	
Contract Description:	**Central Subway Partnership (Project Manager/Construction Manager)**	
Status:	On-going.	
Cost:	Original Contract Value	$85,139,092
	Approved Change Orders	$0
	Current Contract Value	$85,139,092
	Expended to Date	*$58,536,776*
	% Expended	*68.8%*
	SBE Participation	*39.7%*
Schedule:		
Issues or Concerns:		

Contract No.	**CS 156**	
Contract Description:	**Project Controls Consultant**	
Status:	On-going.	
Cost:	Base Contract Value	$17,112,873
	Approved Change Orders	$0
	Current Contract Value	$17,112,873
	Expended to Date	*$9,669,141*
	% Expended	*56.5%*
	SBE Participation	*29.0%*
Schedule:		
Issues or Concerns:		