MONTHLY MONITORING REPORT
July 2017

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

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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 SFMTA's 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 June 2017, the project was 68.5% complete based on expenditures.* There was one active construction contract: 1300 Stations and Systems/Trackwork*, which was 55.64% complete based on incurred cost.* Substantial completion of this contract 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 *(the same date as the May forecast).* The contractor has submitted revised schedule updates through June 2017. *SFMTA rejected the latest schedule update because the contractor unilaterally changed the durations of activities associated with the train control system.* 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 PMOC notes that the forecast RSD has not changed over the past two reporting periods. The accumulation of delays appears to have been arrested, at least temporarily, which is a positive development.***

The Big Hairy Audacious Goals (BHAGs) identified for each of the work packages have thus far been ineffective in arresting the accumulation of delays. *SFMTA asserts that the BHAGs have reduced the magnitude of the delays, although the PMOC is unable to confirm whether this is the case.* SFMTA and the contractor collaborated to start work on the CTS crossover cavern, which was on the critical path, early. Advancing this work maintained the previous substantial completion date, even though the production rate for mining at the CTS platform cavern continued to be below plan *in May and June.*

Excavation at UMS reached the invert level in the station box and placement of the invert slab should be completed in August. ***This significant milestone leaves CTS as the only station where mass excavation is incomplete.***

Table 1 - Core Accountability Items

Project Status: *(as of June 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 May)
	Total Contingency (Including Approved Contract Changes)	$185,500,000	*$ 75,506,044 (reduced $480,878 from May)*
Schedule	Revenue Service Date	12/26/2018	12/10/2019 (SFMTA forecast)
Total Project Percent Complete	Based on Expenditures	*68.52%*	
	Based on Earned Value	*69.33%*	
Major Issues	**Status**	**Comments/Planned Action**	
Schedule Contingency	Based on the latest program master schedule, there is negative schedule float of nearly 12 months.	*Schedule workshop held on July 26, 27. Several time-saving strategies under evaluation. SFMTA to identify range of potential RSDs and possible "Revenue Service Demonstration" that could include operation over a portion of the alignment with free fares.*	
Cost Contingency	*The current Total Contingency is $75.5 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	*Several staff positions on the project team remain open.*	*SFMTA has identified candidates for most of the vacant positions.*	
Date of Next Quarterly Meeting:		*November 16, 2017*	

Earned Value (EV): *$ 1,094,163,514, an increase of $50.22 million from May. SFMTA has re-evaluated its method of calculating EV, resulting in a large increase in this metric for June 2017.*

Planned Value (PV): *$ 1,420,728,126, a planned increase of $31.72 million from May.*

Actual Cost (AC): *$ 1,081,527,629, an increase of $11.12 million from May.*

Cost Performance Index (CPI): 1.01. 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).

Schedule Performance Index (SPI): *0.77.* SPI greater than 1.0 is ahead of schedule and less than 1.0 is behind schedule. SFMTA has identified the minimum acceptable SPI to be 0.90. *The SPI improved by .02 in the June update.*

Contingency

Cost Contingency

The total available contingency (approved contingency less approved contract changes) *as of June 30, 2017* was $*75,506,044*, which is above the minimum required contingency of $60 million *and about $500,000 less than in May. As of August 2, 2017, 73 contract modifications had been executed* for the 1300 Contract with a combined value of $7.73 million.

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 the contractor to be successful in obtaining additional compensation for increased costs due to delays and other factors determined to be beyond its control. Despite the potential for higher soft costs and increases in the 1300 contract value, 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 schedule recovery and mitigation 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. *Recent changes in the sequence of work have arrested the previous trend of accumulation of delays. SFMTA will be working with the contractor over the coming weeks to evaluate and implement schedule recovery strategies identified at the schedule containment workshop held on July 26 and 27. SFMTA will work with the contractor to correct inappropriate schedule logic in the current contractor's schedule that may be causing inaccurate forecasts. SFMTA also is confirming the appropriateness of the durations assigned to several activities by better defining the scope of work of these activities. After establishing a revised base case schedule, SFMTA will identify schedule risks and associated potential delays to the project. SFMTA will then apply risk assessment methods to establish a range of dates for the RSD and will identify risk mitigation measures to reduce the potential effects of the top risks. The difference between the base case RSD and the extended RSD reflecting schedule risks will establish schedule float through project completion.*

PMOC Observations, Opinions, and Concerns

The PMOC notes that the forecast RSD has not changed over the past two reporting periods. The accumulation of delays appears to have been arrested, at least temporarily, which is a positive

development. In the opinion of the PMOC, SFMTA and the contractor demonstrated effective collaboration to minimize schedule delays by advancing critical path work ahead of the baseline schedule.

SFMTA and the contractor are encouraged to develop an achievable schedule for completion of the remaining work that reflects recent changes in the work sequence *at CTS, implements corrections to the schedule logic, and is based on* achievable production rates for critical path work based on the actual production rates. *SFMTA should work with the contractor to review and, as appropriate, implement schedule containment strategies identified at the schedule workshop conducted in late July. (See page 15.) The PMOC supports SFMTA's plans to establish a range of potential RSD achievement dates based on a refined project master schedule and recognizing the remaining schedule risks.*

In the opinion of the PMOC, although setting and working toward BHAGs may be encouraging cooperation and collaboration between Tutor Perini Corporation (TPC) and SFMTA in advancing the current work, this practice, by itself, has been ineffective in arresting the ongoing schedule slippage. *SFMTA and the contractor should select future BHAGs to advance critical path work and facilitate the start of train control and other systems testing.*

The PMOC notes that construction at UMS reached a significant milestone with the completion of mass excavation to the invert level in the station box. With excavation completed at YBM and UMS, the significant risks associated with excavation can be retired for all stations except CTS. In the opinion of the PMOC, uncertainty regarding the future rate of advancement for the platform cavern and crossover cavern mining at CTS represents the greatest schedule risk for the project. SFMTA's risk update should further detail the potential effects of this risk on the project completion schedule.

The PMOC noted that earned value increased by more than $50 million in June, reflecting an adjustment in SFMTA's methodology for estimating earned value, which had been trending lower than actual project cost.

It appears likely that resolution of the large number of time-related contract disputes between SFMTA and the contractor will be challenging and time consuming since the contractor and SFMTA positions are far apart. The PMOC recommends that SFMTA recognize the likelihood of increased soft costs in its forecast of potential cost increases and continue to maintain sufficient cost contingencies to address the potential outcomes of the dispute resolution process.

In the opinion of the PMOC, the available cost contingency for the CSP remains sufficient to address potential cost increases. It is likely that contingency transfers from other cost categories will be required to cover construction cost increases.

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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 is underway. 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. Repairs for leaks at the portal were completed, but were not completely effective. Coordination of access to the tunnel for the leak repair work with ongoing station construction has been challenging.

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 May 2017, the construction of the Stations and Surface, Track, and Systems Contract was 55.60% complete based on cost and 56.11% complete based on the value of completed construction. The contractor and SFMTA have been establishing "Big Hairy Audacious Goals" (BHAGs) as a means of encouraging focus and collaboration between the contractor and agency project team members to maintain and enhance schedule performance. The BHAGs are established for critical path and other important activities in the schedule and are defined so as to be difficult to achieve.*

Union Square/Market Street Station (UMS): The *previous* BHAG for this work package was to complete excavation and placement of support of excavation for the station box by June 1, 2017. *That BHAG was not achieved as the excavation was not completed until July 15. The invert slab for the station is underway and all pours for the invert should be complete by the end of August.*

Additional BHAGs for completion of utility relocations and upgrades at the streets crossing the UMS construction site were established. The BHAG for Ellis Street of July 15 was missed and the current look-ahead schedule does not indicate a completion date for this work. The BHAG for Geary Street of July 22 was achieved and the work to achieve the BHAG of September 30 for O'Farrell Street is underway. The base slab for the HVAC duct chase at the North Concourse was completed and mechanical, electrical, and plumbing (M/E/P) rough-in and placement of structural steel continued at the concourse level of the north entrance.

Chinatown Station (CTS): *Work on the top-center drift for the southern portion of the platform cavern continued and excavation of the top-center drift started on July 25 for the northern portion of the cavern. Excavation of the left and right side drifts of the crossover cavern continued and will extend through August.* SFMTA reported that the early start by the contractor of the excavation of the crossover cavern offset ongoing delays to the platform cavern excavation so that no additional overall delay was incurred in May or June. **In the opinion of the PMOC, SFMTA and the contractor demonstrated effective collaboration to minimize schedule delays by advancing this critical path work ahead of the baseline schedule.**

The BHAG for completion of the mining for the platform cavern was revised again to September 30, 2017 from September 15, 2017, the second extension of two weeks in the past two months. The rate of advancement for the mining work has improved, but it has not reached the rate assumed in the baseline schedule. ***In the opinion of the PMOC, uncertainty regarding the future rate of advancement for the platform cavern and crossover cavern mining represents the greatest schedule risk for the project.***

Yerba Buena/Moscone Station (YBM): The previously defined BHAG for YBM is to have the escalators ready to install by September 1, 2017. *Work to achieve this BHAG is underway. SFMTA and the contractor, Tutor Perini Corporation (TPC), identified two additional BHAGs for completion of utility work, with utility work at 4th and Folsom Street to be completed August 22 and utility work at 4th and Howard Street to start by August 15 and finish by October 17. The Folsom Street work is on-track to meet the BHAG. The start of work at Howard Street may be delayed by underground differing site conditions and the need to temporarily relocate overhead power lines used by Muni trolley buses for non-revenue movements.*

Remaining utility and street 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 latest forecast of the opening date of the hotel is October 2017. The contractor plans to complete the required curb and gutter work along Clementina Street in early August. The remaining work to plane the road surface and place new asphalt paving is not scheduled but can be completed easily before the hotel opening.*

Finishing work continued on the concourse level of the station. *Preparation for placement of the permanent station walls continued at the platform level, with the walls now planned to be poured in August. Interior wall construction and rough-in work for MEP systems will follow completion of the exterior platform walls. In the headhouse, the contractor will build the walls surrounding stair 6 and elevators 3 and 4 in August. The contractor will start construction of the concourse level slab in August as well.*

Surface, Track, and Systems (STS): The *previous* BHAGs for this work package included:

- Complete all utility work and pavement restoration south of Bryant Street by May 31, 2017 – *now targeted for September 30.*
- Complete all utility work and pavement restoration through the Bryant Street/4th Street intersection to the portal by July 15, 2017 – *now targeted for September 30.*

Utility work along the surface segment of the project on 4th Street is progressing toward completion. Muni power ductbanks and streetlights were scheduled to be completed in early August. Much of the major sewer work has been completed, with the remaining work consisting of completion and tie-in of a 36" sewer line at Bryant and Brannan streets and construction of a manhole for the 78" sewer than was rehabilitated by the project. A few other minor sewer line activities will continue through the month of August. Waterline work at Brannan Street is being delayed by the need to address an issue with insufficient depth of the lines. Other waterline and AWSS work will continue along 4th Street through August.

The last section of the tunnel invert slab between YBM and UMS was completed in July. The contractor is currently installing plinths that will support the track in the YBM station. Completion of that work is expected in August, followed by the installation of track between YBM and UMS.

Despite the focused attention of the CSP's senior management team on achievement of the BHAGs, to date these goals have not been effective in arresting schedule slippage, in part because the target dates have not been achieved. The Revenue Service Date (RSD) did not slip in May or June because critical path work on the crossover cavern, which was originally planned to start after excavation of the platform cavern was complete, started early.

In the opinion of the PMOC, the recent pattern of month-by-month extension of the projected RSD was detrimental to effective management of the project because the project team did not have achievable schedule targets to manage to. SFMTA and the contractor should 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. SFMTA and the contractor should agree on the forward-looking schedule as soon as possible.

The PMOC convened a schedule workshop in July 2017 with the objective of identifying a range of likely feasible construction completion dates and RSDs. The results of that workshop are documented in the schedule section of this report. SFMTA is currently evaluating the identified schedule containment strategies and plans to work with the contractor to implement changes in the sequence of work that could save time.

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

Bay Area Rapid Transit (BART)

SFMTA is coordinating with BART for the completion and acceptance by BART of shared facilities at the south end of the UMS station.

California Department of Transportation (Caltrans)

SFMTA needs an Encroachment Permit to install electrical and traffic signal equipment at the I-280 off ramp. SFMTA delivered the permit application materials to Caltrans and is working to address Caltrans' comments on the application.

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 is working to approve items on 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 are complete. 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. The builder's insurance policies maintained by the contractor cover the costs associated with these claims 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 process is complete and the assembly process is reported to be ahead of schedule. SFMTA had received six cars as of August 3, which satisfies the vehicle requirement for operation of the*

CSP. SFMTA is conducting testing on the cars delivered by the supplier, including dynamic testing on the existing system during service closures at night and on weekends.

Real Estate

SFMTA has acquired all project right-of-way, 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 *June 30, 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.

B. PROJECT MANAGEMENT PLAN AND SUB-PLAN IMPLEMENTATION

Project Management Plan (PMP)

SFMTA delivered an update of the PMP in April 2017. *At the August QPRM, SFMTA introduced the new Capital Programs and Construction (CP&C) Quality Manager* (*QM) and presented a revised CP&C organization chart showing that three engineers report to the QM.*

Environmental Assessment/Mitigation Plan/Archaeological Plans

The PMOC received the First Quarter 2017 Mitigation Monitoring Reporting Program (MMRP) update from SFMTA on July 27, 2017.

Real Estate Acquisition Management Plan (RAMP)

SFMTA submitted RAMP Revision 5, dated September 26, 2013, to FTA on November 19, 2013. SFMTA has acquired all required real estate for the project 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 positions in the SFMTA CSP project staff are now vacant, including the Project Controls Manager, Contract Claims Administrator, Estimator, Assistant Resident Engineer, Office Engineer, and Construction Inspector positions. *Overall, the project team is 10 members smaller than planned for in the staffing plan. Four or five of the unfilled positions are in the start-up and safety security portion of the team, which is ramping up later than planned due to delayed completion of station construction.* **In the opinion of the PMOC, the number of vacancies on the project team could cause challenges in meeting the management demands of the project.** ***The contract administration component of the staff is larger than planned and should be sufficient to address the large numbers of contractor change requests and claims.***

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

The 1300 Contract includes a Dispute Review Board (DRB) as a resource for helping to achieve resolution of contract disputes. SFMTA and the contractor are planning to bring disputes that have reached the claims stage to the DRB. **In the opinion of the PMOC, this is an appropriate use of the DRB.** *However, the contractor and SFMTA have disagreements regarding DRB procedures. These disputes will be discussed at the next DRB meeting.*

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), Proposed Contract Changes (PCC), *Notices of Potential Claims (NOPC) and Certified Claims* 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 contract change management log includes CORs that have been determined to have merit as well as agency-initiated PCCs that are progressing through negotiations toward a contract modification (CMod). *The NOPC log and the Claim log include CORs rejected by SFMTA and for which the contractor expects to or has submitted a claim.* **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 an action item has been identified for SFMTA's response.**

The most recent versions of the Trend Log and Trend Summary documents are dated August 2, 2017. The Trend Summary indicates that 73 contract modifications had been executed for the 1300 Contract. The total value of executed CMods was $7,726,806. The NOPC log indicates that there are 55 potential claims and the Claim log shows that 38 of these potential claims have been certified and submitted by the contractor.

Note that tables 2 and 3 reflect the project status as of the end of *June 2017* and may show different values for approved contract changes.

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

Cost estimate: $1.5783 billion.

Total contingency: *$75.51 million* (minimum contingency is $60 million), *slightly lower than in May.*

Actual Cost (AC): *$1,081,527,629, an increase of $11.12 million from May (68.52% of the total project budget)*.

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

Earned Value (EV): *$1,094,163,514, an increase of $50.22 million from May.*

Cost Performance Index (CPI): *1.01.*

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 1.0 indicates a cost underrun, and a value of less than 1.0 indicates a trend towards 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 earned value increased by more than $50 million in June, reflecting an adjustment in SFMTA's methodology for estimating earned value.***

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 the contract dispute resolution process.

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 *54%* of the potential left to spend for Contract 1252. *After potential changes are accounted for, there is now only $1.73 million in contingency remaining for Contract 1300.* **The resulting contingency of *less than 1%* of potential remaining spending after potential changes are accounted for is likely insufficient. However, 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 $4.77 million or 1.2% of the potential remaining work, which is an improvement over May.* **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 probably insufficient given the pending contract changes and there is a significant likelihood that additional contingency will need to be allocated to this contract prior to completion.**

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	*7,726,805*
Current Contract (1252 does not include non-project costs)	235,078,785	*847,403,205*
Remaining Contingency	834,715	*32,273,195*
Potential Changes (SFMTA expected outcome)	*20,000*	*30,540,258*
Estimate at Completion	*235,098,785*	*877,943,463*
Contingency Less Trends	*814,715*	*1,732,937*
Spent to Date	*233,589,322*	*498,266,830*
Potential Left to Spend	*1,509,463*	*379,676,633*
Contingency Less Trends as % of Potential Cost to Complete	*54.0%*	*0.5%*

[1] *As reported in the June 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 *9.9%* 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 June 30, 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%**			**229,972,919**	81%	**55,254,960**			
10.02	Guideway: At Grade, Semi-exclusive	2,395,143	464,857	2,860,000	19%			552,500	19%	2,307,500			
10.06	Guideway: Underground cut and cover	74,407,195	(4,590,788)	69,816,407	-6%			62,308,677	89%	7,507,730			
10.07	Guideway: Underground tunnel	224,933,257	(23,592,511)	201,340,746	-10%			161,370,226	80%	39,970,520			
10.09	Track: Direct fixation	7,293,157	(532,068)	6,761,089	-7%			3,122,916	46%	3,638,173			
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**	**154,358,532**	**587,057,267**	**36%**			**339,876,134**	58%	**247,181,133**			
20.01	At-grade station	774,913	6,827,944	7,602,857	881%			1,508,488	20%	6,094,369			
20.02	Aerial station, stop, shelter, mall, terminal, platform		2,901,013	2,901,013	NA			-	0%	2,901,013			
20.03	Underground station	412,084,888	142,766,672	554,851,560	35%			334,481,798	60%	220,369,762			
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**	**(18,130,096)**	**214,421,531**	**-8%**			**197,593,946**	92%	**16,827,585**			
40.01	Demolition, clearing, earthwork	8,887,028	3,468,587	12,355,615	39%			11,938,516	97%	417,099			
40.02	Site utilities, utility relocation	29,562,587	30,988,240	60,550,827	105%			64,621,489	107%	(4,070,662)			
40.03	Haz. Material, contam'd soli removal, ground water treatment	2,957,442	4,576,686	7,534,128	155%			4,652,034	62%	2,882,094			
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%			2,550,340	26%	7,240,655			
40.07	Automobile, van, bus accessways, including roads and parking lots	11,919,550	(5,340,451)	6,579,099	-45%			3,754,889	57%	2,824,210			
40.08	Temporary facilities and other construction indirect costs	158,790,820	(45,009,283)	113,781,537	-28%			106,751,147	94%	7,030,390			
50	**Systems**	**108,429,774**	**(13,087,948)**	**95,341,826**	**-12%**			**26,852,893**	**28%**	**68,488,933**			
50.01	Train control and signals	37,447,116	(9,319,177)	28,127,939	-25%			7,301,619	26%	20,826,320			
50.02	Traffic signals and crossing protection	3,013,232	9,549,297	12,562,529	317%			9,874,301	79%	2,688,228			
50.03	Traction power supply	20,379,634	1,085,439	21,465,073	5%			8,017,780	37%	13,447,293			
50.04	Traction power distribution	16,239,951	(3,798,838)	12,441,113	-23%			1,470,689	12%	10,970,424			
50.05	Communications	28,545,305	(16,514,719)	12,030,586	-58%			188,503	2%	11,842,083			
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%**	**1,146,720,593**	**35,327,910**	**794,295,892**	**67%**	**387,752,611**	**382,984,960**	**1,177,280,852**	**4,767,651**
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**	**(32,829,239)**	**328,739,121**	**-9%**	**310,518,042**	**18,221,079**	**254,352,434**	**77%**	**74,386,687**	**56,165,608**	**310,518,042**	**18,221,079**
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		61,318,331	-
80.03	Project Management for Design and Construction	191,025,800	(88,107,410)	102,918,390	-46%	89,012,545	13,905,845	68,306,239	66%	34,612,151	25,801,371	94,107,610	8,810,780
80.04	Construction Administration and Management	15,495,521	78,558,172	94,053,693	507%	91,096,881	2,956,812	67,086,631	71%	26,967,062	18,915,184	86,001,815	8,051,878
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	78,823	6,419,019	380,981
80.06	Legal, Permits, Review Fees by Other Agencies	7,242,340	970,264	8,212,604	13%	8,212,604	-	4,384,024	53%	3,828,580	3,368,456	7,752,480	460,124
80.07	Surveys, Testing, Investigation, Inspection	234,036	699,064	933,100	299%	933,100	-	833,361	89%	99,739	47,461	880,822	52,278
80.08	Start up	8,400,329	(100,000)	8,300,329	-1%	6,941,907	1,358,422	-	0%	8,300,329	7,835,290	7,835,290	465,039
Subtotal (10 - 80)		**1,514,958,258**	**54,461,340**	**1,569,419,598**	**4%**	**1,502,793,956**	**66,625,642**	**1,081,527,629**	**69%**	**487,891,969**	**451,826,586**	**1,533,354,215**	**36,065,383**
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**	**-**	**1,578,300,000**	**0%**		**75,506,044**	**1,081,527,629**	**69%**	**496,772,371**	**451,826,586**	**1,533,354,215**	**44,945,785**

SCC Breakdown of Forecast Construction Costs Not Available

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

Change Order Control

SFMTA continues to estimate that CMods with a net increase in contract value of only $20,000 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 infrastructure projects.

SFMTA is maintaining its management tools for tracking potential contract changes for the 1300 Contract. *The latest CN1300 Trend Summary is dated August 2, 2017. This report shows that 73 contract modifications have been approved for a net increase in the contract value of $7,726,806. CORs (generated by the contractor) that have been determined to have merit and PCCs (generated by SFMTA) have a combined expected value of $24,926,159 in increased contract value, a decrease of $1.97 million since July 12.*

An additional 626 items are being tracked in the Trend Log. Of these, SFMTA judged 294 items to be without merit and denied them. A further 262 items have been voided and are carried at no cost. There are 55 items covered by certified claims and NOPCs by the contractor ($15.50 million total exposure, $920,000 greater than last month), and 15 items are "open" or "new" and awaiting a determination of merit.

The maximum exposure of the project to additional costs from the denied items, NOPCs, claims and open items is $29.84 million. SFMTA's expected value of the final cost of these items is $5,614,099, which when added to the $24.93 million in merited contract changes yields SFMTA's estimate of the total impact of trends of $30.54 million. The worst-case exposure of the project to additional costs for the 1300 Contract is $54.77 million. The difference between SFMTA's estimate and the worst-case cost exposure is $24.23 million, which is less than the contingency remaining in the program budget after trends of $44.95 million. ***In the opinion of the PMOC, the available cost contingency for the CSP remains sufficient to address potential cost increases. It is likely that contingency transfers from other cost categories will be required to cover construction cost increases.***

The total estimated cost impact of the identified trends decreased by about $1.10 million from July 12, 2017 to August 2, 2017. The worst-case exposure of the project to increased costs declined by the same amount.

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

1. Change to grade 50 steel from specified grade 70 steel (due to availability issues) - $572,884
2. Extra trucking costs for contaminated soil at CTS - $2,274,225
3. Harder rock than anticipated for CTS slurry wall excavation - $2,820,600
4. Delays to installation of tangent piles at UMS - $1,082,380
5. UMS Garage underpinning requirements - $732,157

6. 12-inch waterline at UMS, added scope - $336,236
7. Utility conflicts with sewer line installation at UMS - $744,465
8. Changes in construction sequence for UMS Garage - $500,000
9. UMS art glass installation requirements - $382,978
10. Obstructions to jet grout placement at UMS - $2,062,420
11. Change in track switch machine manufacturer at STS - $391,909
12. Additional monitoring instruments at CTS - $429,777
13. Extra work to prepare existing tunnel - $431,423
14. Additional traffic control requirements at 4th and King - $675,001
15. Incomplete interface design at STS - $300,001
16. Additional traffic control requirements for STS work package - $1,032,302
17. Cost of changes to the design of CTS to accommodate the plaza requested by the community - $4,618,428
18. Change in vent for emergency generator at all stations - $500,001
19. *Contractor delay claim for revised work sequence at CTS - $250,001 (new value over $250,000)*
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
23. Change in drain piping details at UMS - $332,252
24. Temporary drainage at Union Square Garage ramps - $292,754
25. Change in automatic train control system for reverse running - $400,001
26. Design changes for UMS vertical drainage slots - $866,709
27. Claim for extra costs and time due to extremely hard ground claimed by TPC during the coring for the SEM mining work - $862,720
28. Escalator raceways at UMS - $492,065
29. Extra costs for SEM excavation at CTS due to tunnel segments being 5 feet wide - $4,404,329
30. Extra costs due to concrete obstruction at CTS south platform cavern - $583,623
31. Time impacts due to power pole conflict during demolition at CTS - $3,516,164
32. Time impacts from extended submittal reviews and substitution request procedures - $3,021,262

33. Claimed delays to SEM work at the platform invert due to compensation grout exclusion zone requirements in the contract specifications - $900,889
34. Estimated extra costs of proposed scope increase to provide sidewalk bulb-outs at 4th and Bryant and 4th and Harrison - $1,500,000
35. Claimed extra costs for a schedule delay to the train control subcontract - $2,000,001
36. *Claimed extra costs for delays to the CTS south platform center drift excavation due to restrictions caused by compensation grouting - $675,952 (increased from $450,000)*
37. *Extra costs for jet grouting complications at Macy's basement at UMS - $599,421 (new)*

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

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 an update of the master program schedule in July representing progress on the project through June 2017. The contractor has submitted revised schedule updates through June 2017, but SFMTA rejected the contractor's latest schedule update because the contractor changed the durations of activities associated with the train control system, which resulted in the train control work being the critical path for the entire project. The contract does not allow the

contractor to make changes to the durations of activities or work sequence in the baseline schedule without review and concurrence by SFMTA.

As of the end of July 2017, the project was 349 days late, based on the projected RSD of December 10, 2019. The projected substantial completion date for the 1300 Contract was June 26, 2019, which is 502 days later than the original date (February 9, 2018). *There were no changes to these milestone dates over the past two schedule updates.*

TPC has issued several major delay claims and NOPCs for CTS and the other work packages. *SFMTA and TPC plan to address the claims through the Dispute Review Board (DRB) process.* Two recent major delay claims are associated with the train control system, with the train control subcontractor claiming delays to its work and the prime contractor claiming extended overhead associated with train control work that will be completed after the construction work on the stations. *The contractor also is asserting that conditions beyond its control have delayed the excavation of the platform cavern at CTS.* **The PMOC is concerned that resolution of the outstanding claims will be challenging because the parties' respective positions are far apart. SFMTA and the contractor should make appropriate use of the partnering and DRB processes to facilitate resolution of the disputes regarding allowable time impacts.**

The critical path for the construction work continues to flow through the construction of CTS, but analysis by the PMOC indicates that there are other lines of work that are influencing the RSD for the project. The projected RSD forecast remains 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 likely based on the progress of work on the critical path *and schedule risks that may affect the project in the future. SFMTA is conducting a risk assessment of the schedule to establish a range of possible construction completion dates and start dates for revenue service. SFMTA will also identify mitigation measures to reduce the potential effects of the major risks.*

The contractor started critical path work on the crossover cavern in advance of the completion of the platform cavern. Advancing this work while the platform cavern excavation is still underway allowed the RSD to be maintained, despite excavation production rates in May and June that continued to be lower than assumed in the baseline schedule for the platform cavern. 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.

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 September 15, 2017 to September 30, 2017*		*Excavation ongoing. Early start of crossover cavern is mitigating effects of delayed completion.*

Milestone	Target Date	Actual Date	*Status*
UMS			
Complete excavation to invert in station box	*June 1, 2017*	*July 15, 2017*	*Completed*
Complete utilities in Ellis Street	*July 15, 2017*		*Unknown, not yet complete*
Complete utilities in Geary Street	*July 22, 2017*	*July 22, 2017*	*Complete*
Complete utilities in O'Farrell Street	*September 30, 2017*		*In progress*
YBM			
Escalators ready to install	*September 1, 2017*		*In progress*
Complete utilities at Folsom Street	*August 22, 2017*		*In progress, on schedule*
Complete utilities at Howard Street	*Start 8/15 – finish 10/17*		*Being delayed by conflicting OCS lines*
Complete headhouse roof slab	*November 30, 2017*		*In progress*
STS			
Complete all utility work along 4th Street	*Delayed from May 31, 2017 to September 30 at Brannan Street*		*In progress*
	Delayed from July 15, 2017 to September 30 at Bryant Street		*In progress*
Start trackwork at 4th/King	*August 22, 2017*		*Not shown in look-ahead schedule*

In the opinion of the PMOC, although setting and working toward the BHAGs 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 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 all of the lines of work that are driving the RSD must be taken by SFMTA.

The PMOC and SFMTA convened a schedule workshop on July 26 and 27, 2017 with the objective of agreeing on an approach to establishing a reliable forecast of the project RSD. In preparation for the workshop, the PMOC reviewed and analyzed SFMTA's updated master program schedule dated April 2017. At the workshop, the June update was also reviewed and found to be essentially the same as the April update. The PMOC identified the following lines of work that are currently influencing the RSD:

- *Chinatown Station construction, start-up and testing;*
- *STS work (utilities, slabs, trackwork & pavement) leading to testing of tunnel and ATCS systems;*
- *STS tunnel work (concrete, trackwork, cables) and testing;*
- *ATCS software design, approval, installation & testing;*

- *Radio system design, approval and installation;*
- *Union Square/Market Street Station construction leading to building startup and testing*

Achieving significant time savings on the current longest path (construction, start-up and testing at CTS) would likely result in one of the other lines of work becoming the longest path. Conversely, delays to the other lines of work listed above could result in that work becoming the longest path. ***SFMTA should focus management attention on all of these lines of work, which are influencing the RSD for the CSP.***

The workshop identified several needed corrections to the implementation of the schedule in Primavera P6 and the following actions for refinement of the sequence of work, maintenance of the schedule and identification of possible time-saving strategies:

- ***As-Built Schedule*** *- SFMTA has continued to generate its own accurate as-built project schedule. This effort is ongoing based upon reliable project documentation and experiences. Recently, SFMTA and TPC have been making a good faith effort to revisit and correct past unacceptable CPM update submissions, to fairly and accurately reconcile project history.* ***The PMOC commends the project for this effort and urges its continuance.***
- ***BHAGS*** *- SFMTA has continued to establish interim targets that challenge the team to improve project performance in specific instances. This is an effort receiving focus from top-level management. It was suggested that achievements be 'celebrated' by project participants as points of pride and encouragement.*
- ***Major System BHAGs*** *– It was suggested that each of the major systems, or portions thereof, which are critical to station and system operation, be made the focus of future BHAGs. Accomplishments could reduce risks to timely operations, and might even improve dates. Systems could include parts of life safety, fire suppression, HVAC, traction power, ATCS, etc.*
- ***Specific Logic Revisions****- Identify work in the schedule where items might be accelerated by earlier starts, concurrent progress, etc. One example was ductwork, equipment and conduit in and around the Main Electric Rooms at CTS and UMS.*
- ***Advance Trackwork At UMS*** *– Review in the detail a method to allow track work and other tunnel work to commence and continue concurrently with construction of the UMS mezzanine. This could serve to accelerate completion and testing of tunnel systems, if there is little or no negative effect to UMS completion.*
- ***Advance Traction Power Date At YBM*** *– This goal could advance readiness for testing of numerous station systems, as well as in the tunnel.*
- ***"Define Building System Startup & Testing"*** *– What is the detailed scope of these activities? It is likely that they can start earlier than scheduled and perhaps durations can be reduced as well.*
- ***Status Actualized Work More Accurately****– Part 1 of this item entails reduction or elimination of large schedule lags associated with activities already commenced, as well as other lags that are no longer necessary. Part 2 involves accurately updating every*

schedule activity so that none can falsely extend downstream work dates. An example found at the workshop was trackwork and concrete invert, which were not properly actualized.

- ***Excavation Advances** – Consider allowing 8-foot advances in lieu of present 4-foot in order to improve productivity.*

Implementing the recommended schedule refinements and corrections and agreeing with the contractor on changes in the sequence of work will allow SFMTA to establish a revised best-case project schedule and RSD. With the best-case forecast as a starting point, SFMTA plans to apply risk analysis to establish a range of possible outcomes for the construction completion date and the project RSD. SFMTA plans to use its established Risk Mitigation meetings to identify and evaluate the possible impacts of schedule related risks. The risk assessment will also include identification and tracking of mitigation strategies for the top schedule risks. ***The PMOC supports SFMTA's planned approach to identifying a range for the RSD for the project. The PMOC encourages SFMTA to complete its assessment according to the dates shown in Table 8.***

Project Schedule Data

Earned Value (EV): *$1,094,163,514, an increase of $50.22 million from May.*

Planned Value (PV): *$ 1,420,728,126, a planned increase of $28.83 million from May.*

Schedule Performance Index (SPI): *0.77.* 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 1.0 indicates more work was completed than planned and a value of less than 1.0 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 *0.77* indicates that the project is significantly behind schedule *but is improved from 0.75 in May.*

The PMOC notes that there was a substantial increase in earned value for the month of June. Based on the reported cost and earned value for the previous few months, it appeared that SFMTA was under estimating the earned value. The large increase in June reflects a correction for this previous under-reporting of earned value and not a major advance in project completion.

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)

	(P = Planned Date, A = Actual Date, F = Forecast Date)
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 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 *and O'Farrell Street*

Continue exterior finishing work at the plaza level of the Union Square Garage and the north entrance.

Complete the fan-level structure in the north concourse

Complete placement of the invert slab in the station box

Complete construction of access shaft at O'Farrell Street

Complete the invert in the Ellis Street Annex area

Install elevator in the BART annex

Begin construction of the mezzanine level floor slab

CTS

Complete excavation of the station platform cavern

Continue excavation of the crossover cavern

Provide compensation grouting as needed

YBM

Continue bottom-up construction of the headhouse

Continue M/E/P rough-in and interior work mezzanine and concourse levels

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

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

Complete street work on Clementina Street

Install escalators

STS

Complete all utility work and street restoration along 4th Street

Start trackwork at 4th and King

Install track from YBM to UMS

The PMOC expects to attend the following meetings:

- Weekly Management (September 11, October 2 and November 13)
- Weekly Contract 1300 Construction Progress Meetings (September 12/13, October 3/4 and November 14/15)
- Weekly Configuration Management Board (CMB) (September 13, October 4 and November 15)
- CSP Risk Management Meetings (September 7, October 5 and November 16)
- CSP PMOC Status meetings (August 1, September 12, and October 3)
- FTA/QPRM tentatively scheduled for *November 16, 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 *acceptable, with some exceptions. There have been some cases where the QA/QC process did not work as intended. SFMTA noted that the contractor's QCM had not identified a field condition that was inaccurately reflected in the contract drawings and which caused those drawings to be inadequate for inspection of the placement of reinforcing steel. The SFMTA RE recognized the condition and halted the work so that the designer of record could identify the changes needed to accommodate the actual field conditions prior to pouring concrete.* The quality concerns for the 1300 Stations Contract identified in the SFMTA *June* monthly report included:

- *SFMTA QA issued a large number of Non-Conformance Notices (NCNs) in June. NCNs are issued when the contractor fails to issue a CNCR. The SFMTA monthly report notes that contractual bickering is hindering the resolution of technical and quality issues, resulting in the need for SFMTA to issue NCNs.*
- As is typical to similar projects, work performed prior to receipt of approval status of required submittals/Requests for Information (RFI) remains a potential area of concern.

As of July 26, 2017, TPC's Quality Manager had filed 300 CNCRs (no change since the last report). Ten new items were under review, 20 other items had responses identified but not yet approved, the proposed responses to 11 items were disapproved, and 21 items had approved responses that were not yet implemented. In addition, 200 items were closed (2 more than in mid-July) and 38 items had been voided. None of the open or disapproved items is delaying progress of the work. **In the opinion of the PMOC it is positive to have the number of closed items exceed the number of new items in the CNCR list.**

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 started to address the station construction items in 2016. *As of July 31, 2017 93 of the 1660 items on the Safety and Security Conformance Checklist were approved.* 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 June 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 June 2017	No. of Incidents	Incident Rate[1]	Goal
1300 Contract			
OSHA Recordable Accidents	6	*0.51*	<3.4
Job Transfer/Restricted Duty Incidents	0	0	NA
Lost Time Incidents	1	*0.09*	<1.6
Total Incidents	7	*0.60*	NA
Hours Worked	*2,344,065*		

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

I. PROJECT RISK, RISK MANAGEMENT, AND RISK MITIGATION

The PMOC received RCMP Revision 3 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 status of the construction work and the accumulated construction delays.

SFMTA conducts monthly meetings to review the status of identified risks, monitor the implementation of mitigation measures, identify new risk and evaluate the probability and potential impacts of existing and newly identified risks. The current major risk to the project is the potential for further delays to the construction of the stations, which cannot be mitigated or recovered, resulting in further delays to the RSD.

The PMOC attended the August 2, 2017 Risk Mitigation Meeting for the CSP, which included a review of the status of selected existing risks, a review of risks identified for retirement, and the start of a more detailed definition of the potential risks that could cause further schedule delays. Over the next two months, SFMTA plans to expand and refine the schedule risk assessment in order to identify the likely range of project completion dates. 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 (risk 52). SFMTA is evaluating what amount of settlement could be sustained without high risk of damage to the utility lines. *San Francisco Water Department (SFWD) has installed gate valves on the two major water mains that traverse the construction zone. These valves facilitate quick shut-off of water in the event that one of the water lines fails, thereby preventing collateral damage due to water intrusion.*
- The risk that execution of contract modifications takes an extended period of time, resulting in poor working relationships between the contractor's field management and SFMTA REs remains. *Two aspects of the process are taking longer than they should, including REs' review of CORs to determine if changes are merited and the final price negotiations for CMods once merit has been determined. The contractor is taking an unreasonably long time to prepare and deliver price proposals that provide the basis for negotiation of CMods.*
- *Two risks related to delays in testing, commissioning, and system start-up remain. The first risk is that the contractor's testing and acceptance process will take longer than planned. SFMTA noted that a schedule for testing has been prepared and that SFMTA is evaluating options for adjusting the schedule to start some testing work sooner. The second risk is that SFMTA's internal acceptance and start-up tasks take longer than planned. SFMTA CSP staff members have started coordinating with Muni Operations staff members to plan the testing, acceptance and start-up work. SFMTA noted that an early service start (demonstration) is being considered. Such a strategy will require its own plan and schedule.*
- *Risk 234, which is the risk that the SEM work at CTS will result in settlement and damage to adjacent buildings, will continue until the SEM work is complete.*
- *Risk 238, which is the risk that SFMTA's quality program will be ineffective in processing non-conforming work causing schedule delays, continues. The SFMTA QM described the quality program's recent efforts to assure that all work conforms to contract requirements. There have been some challenges with the contractor QCM not identifying field conditions that do not match the contract drawings.*
- *Risks that have been identified for possible retirement include:*

- *Damage to adjacent buildings from compensation grouting at UMS (#36). This risk will continue to have a low probability of occurrence until the invert sab is poured and the temporary excavation support is removed.*
- *Difficulty in obtaining required permits (#103). SFMTA still needs to obtain an Encroachment Permit from Caltrans and is working to address questions and concerns raised by Caltrans regarding the permit application.*
- *Risk that station end walls will leak due to faulty work by the tunnel contractor that is not revealed until the station contractor has completed its work (#115). This risk remains active until the dewatering wells are shut down at each station. The risk is nearly retired at YBM.*
- *Delayed receipt of long-lead items results in delays to project completion (#100). Elevators and escalators have not yet been delivered.*

The previously identified 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 using an updated base case schedule and applying risks to specific activities or lines of work in that schedule. The following types of risk could lead to longer durations for the remaining work tasks.*

- *Risk that the production rates assumed in the baseline schedule cannot be achieved. The most important activity affected by this risk is the completion of SEM work for the platform and crossover caverns at CTS.*
- *Risk that all of the elements of the contract scope of work are not reflected in the baseline schedule. There have been some examples of preparatory work required prior to the start of activities not being identified in the baseline schedule.*
- *Risk that the time included in the baseline schedule does not reflect the actual sequence of work required to complete the activity. A possible example of this risk is that the baseline schedule for the installation of the final lining of the CTS platform cavern assumes shotcrete installation while the contract specifications require formed and poured concrete.*

Specific risk events and their associated probabilities and potential schedule impacts will be identified at the next Risk Mitigation meeting in September.

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, RA	**166**	Update schedule risks based on recovery schedule	12/10/15	*9/21/17*		*Use regular risk mitigation meetings to identify and evaluate schedule risks*
S	**169**	Review and address logic errors and acceleration strategies in the schedule (electrical & HVAC, elevators & flooring, Trackwork at UMS, traction power/station power at YBM)	6/23/16	*8/31/17*		*Confirm logic changes and strategies identified at schedule workshop.*
S	**171**	Provide a range of dates for the Revenue Start Date	6/23/16	*9/21/17*		*Based on results of 166, 169*
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*		
S	**176**	*Accurately status completed and started activities in the schedule*	*7/27/17*	*8/31/17*		*Workshop action item*
S	**177**	*Develop plan, confirm feasibility of "Revenue Service Demonstration"*	*7/27/17*	*TBD*		*Concept raised at schedule workshop*

(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
ARS	Air Replenishment System
ATCS	Advanced Train Control 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
CP&C	Capital Programs and Construction
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
QM	Quality Manager
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 for the current construction contract (1300) work package status meetings.
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 and verified through the Safety and Security Certification process

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 identified safety and security critical tests to be performed prior to passenger operations?	N		Currently being developed.
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 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			

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 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.
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 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.

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**
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		
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:	*August 8, 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

69.3% *Percent Complete Based on Progress* (*June 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
$1,081.5 million	Amount of Expenditures at date of this report from Total Project Budget of $1,578 million
68.5%	Percent Complete based on Expenditures at date of this report
$8.88 million	Unallocated Contingency remaining
$*75.50 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 *$75.50 Million*				


central T subway
Lombard St.
Columbus Ave.
COIT TOWER
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.
FOLSOM
FUTURE TRANSBAY TERMINAL
Post St.
MONTGOMERY
UNION SQUARE/ MARKET STREET
J K L M N T
Market St.
1st St.
N
Mission St.
2nd St.
POWELL
Howard St.
Folsom St.
Harrison St.
BRANNAN
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 now been installed on the water lines above the excavation.* These 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 largest sources of delay are extra time required to establish merit by SFMTA REs and delays in receipt of formal price proposal from the contractor for merited changes.*

#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 has started more intensive coordination with Muni staff to plan and schedule the necessary tasks.*

#232 – Unable to recover accumulated delays, resulting in late RSD. This risk has occurred and the RSD is very likely to be delayed. *A schedule containment workshop was held in July 2017. More specific schedule risks will identified and evaluated in order to establish a range of likely project completion dates.*

#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. 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 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.

#36 – Risk of damage to adjacent buildings from compensation grouting at UMS. This very low risk can be retired once the invert slab is placed in the UMS station box and the temporary struts are removed.

#103 – Risk that obtaining required permits will take longer than planned. SFMTA still needs an encroachment permit from Caltrans for work at the I-80 off-ramp on 4th Street. The application has been submitted and SFMTA is answering questions from Caltrans regarding the application

#115 – Risk of water intrusion at the station headwalls due to non-conforming work by the tunnel contractor that has been accepted by the stations contractor. This risk is low but remains until dewatering equipment is decommissioned at all of the stations.

#100 – Risk that late delivery of long-lead items results in delyed completion of the project. This risk will remain until escalators and elevators are delivered.

Discussion to begin identifying more specific schedule risks followed the review of existing risks. More detail will be developed at the next risk mitigation meeting.

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	3/1/2017	3/21/2017	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	4/2017	4/27/2017	The second draft with additional detail and a schedule for testing and pre-revenue activities was 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 State Safety Oversight (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	
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	*$7.73 million*
	Current Contract Value	*$847.40 million*
	Expended to Date	*$501.39 million*
	% Expended	*59.2%*
	SBE Participation	*19.9%*
Schedule:	NTP issued June 17, 2013. Substantial Completion planned February 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	$35,428,038
	Approved Change Orders	$1,626,722
	Current Contract Value	$37,054,760
	Expended to Date	*$36,570,001*
	% Expended	*98.7%*
	SBE Participation	*35.5%*
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	*$14,365,430*
	% Expended	*83.4%*
	SBE Participation	*24.5%*
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	*$62,684,498*
	% Expended	*73.6%*
	SBE Participation	*32.6%*
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	*$9,820,243*
	% Expended	*57.4%*
	SBE Participation	*29.1%*
Schedule:		
Issues or Concerns:		