MONTHLY MONITORING REPORT
February 2018

FINAL

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

Draft Report Delivered to FTA on March 13, 2018
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PMOC Contract No.: DTFT6014D00010
Task Order No. 5
Project No.: FTA-13-0294

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

David Evans and Associates, Inc.
Bill Byrne, Task Order Manager
Voice – (303) 828-8626; Email – bbyrne@deainc.com
Time on project: 3.5 years

EXECUTIVE SUMMARY

Project Description

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

Four new stations are being constructed as part of the project—an at-grade station at 4th and Brannan streets and three underground stations at Yerba Buena/Moscone Center (YBM), Union Square/Market Street (UMS), and Chinatown (CTS). Four light rail vehicles (LRVs) are included in the budget for the CSP as part of a larger procurement that will expand the LRV fleet and includes options for replacement of the entire 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 January 2018, the project was 74.7% complete based on expenditures.* The one active construction contract: 1300 Stations and Systems/Trackwork, *was 65.9% complete based on incurred cost. Substantial completion of this contract was originally scheduled for February 10, 2018, but the latest master program schedule update forecasts substantial completion on June 12, 2019, a delay of 488 days. SFMTA's most recent update of the program schedule indicates a forecast Revenue Service Date (RSD) of November 22, 2019. This is 331 days later than the required RSD of December 26, 2018 in the Full Funding Grant Agreement (FFGA) but 18 days earlier than the previous forecast. In completing its schedule risk assessment, SFMTA identified embedded float in the baseline schedule. Removing that float resulted in modest time savings and an earlier RSD. SFMTA reported that the latest schedule submitted by the contractor indicates that additional schedule recovery may be possible. Any additional time savings will be reflected in SFMTA's updated schedule risk assessment, expected to be complete in April 2018.*

Excavation of the CTS headhouse to the invert level was completed ahead of schedule on January 25 and mining of the crossover cavern at CTS was completed on February 10. Completion of these activities marks a significant milestone and an end to the largest schedule risk for the project.

The CSP Program Director left the project on February 1, 2018 as previously announced. The Deputy Program Director was named the acting director by the SFMTA Director of Transportation. *New Resident Engineers (RE) have started work at UMS and CTS. SFMTA noted that several new contract modifications (CMods) were issued for the Stations, Track and Systems Contract in February and that several more CMods were being readied for execution.*

Table 1 - Core Accountability Items

Project Status: *(as of January 31, 2018)*		**Original at FFGA:**	**Current Estimate:**
Cost	Cost Estimate	$1,578,300,000	$1,578,300,000
Contingency	Unallocated Contingency	$74,722,000	$9,005,903
	Total Contingency (Including Approved Contract Changes)	$185,500,000	$74,176,637
Schedule	Revenue Service Date	12/26/2018	*11/22/2019 (SFMTA forecast)*
Total Project Percent Complete	Based on Expenditures	*74.66%*	
	Based on Earned Value	*74.66%*	
Major Issues	**Status**	**Comments/Planned Action**	
Schedule Contingency	All schedule contingency has been consumed.	*Latest contractor schedule and SFMTA's schedule risk assessment indicate potential to recover some delay. The Project Management Oversight Contractor (PMOC) to review the assessment.*	
Cost Contingency	The current Total Contingency is unchanged at $74.2 million.	The contingency appears adequate for the current level of project completion. Required contingency should be reevaluated when CTS excavation is complete.	
Technical Capacity and Capability	*The Program Director position is being filled on an acting basis. Recruitment underway for permanent replacement and start-up and testing manager.*	The PMOC will monitor the agency's progress in recruitment and hiring of needed staff.	
Date of Next Quarterly Meeting:		*May 9, 2018*	

Earned Value (EV): *$1,178,387,158, an increase of $10.56 million from December.*

Planned Value (PV): *$1,482,093,391, a planned increase of $9.55 million from December.*

Actual Cost (AC): *$1,178,423,883, an increase of $14.16 million from December.*

Cost Performance Index (CPI): *1.00*, indicating that the value of completed work is consistent with the incurred cost.

Schedule Performance Index (SPI): 0.80, indicating that the amount of work completed is significantly less than planned and the project is behind schedule.

Contingency

Cost Contingency

The total available contingency (approved contingency less approved contract changes) as of March 7, 2018 was $73,938,444, which is above the minimum required contingency of $60 million. SFMTA's latest trend summary report estimates a total potential additional cost increase from claims, denied change order requests, and pending changes of $52.62 million, which is $21.32 million less than the available contingency.

Schedule Contingency

All contingency in the schedule has been consumed, and there is about 11 months of negative float from the baseline schedule. SFMTA has completed an assessment of schedule risks that indicates a high probability that the RSD will be on or before November 27, 2019. The Project Management Oversight Contractor (PMOC) will conduct a review of the schedule risk assessment.

PMOC Observations, Opinions, and Concerns

A reevaluation of required cost and schedule contingencies should be undertaken following completion of excavation and the primary structural support systems at CTS, *expected in April 2018.*

The PMOC notes that several new CMods have been issued and others are near execution. It will be important to build on this positive trend to address the backlog of pending changes. The PMOC recommends that SFMTA work to expeditiously fill the open management positions in the project team. The PMOC supports the concept of assigning a dedicated claims management team, which has been partially implemented by assigning a dedicated CMod support lead to each work package.

The PMOC recommends that SFMTA quickly resolve the ongoing contractual issues regarding the schedule for and management of the Automatic Train Control System (ATCS) to avoid schedule delays. SFMTA initiated the process by informing Tutor Perini Corporation (TPC) of its intent to sever the ATCS contract. Once the contract actions are completed and an updated ATCS schedule is produced, the PMOC proposes to conduct a comprehensive schedule review for the project.

The PMOC notes that work is being delayed by the protracted time taken for Sustainable Streets Division (SSD) review of traffic control plans. In the opinion of the PMOC, SFMTA management should assure that SSD is responsive to the needs of the CSP.

The PMOC notes that the potential cost increases for the project in SFMTA's trend summary report remained relatively stable from February to March 2018. The PMOC also notes that SFMTA and TPC continue to hold executive meetings but have yet to reach resolution on the major disputes regarding delays to construction, which could have significant cost implications. The PMOC continues to note that the forecast for project management costs should be updated to account for higher costs due to the extended duration of the project. Overall cost contingency in the project budget continues to be sufficient to provide reasonable assurance of on-budget completion of the project.

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APPENDICES

A. PROJECT STATUS

Full Funding Grant Agreement (FFGA)

The FFGA for the Central Subway Project (CSP) 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. *Two contract modifications addressing scope changes and resolution of cost impacts to the City have been issued by the San Francisco Municipal Transportation Agency (SFMTA).* The cost and schedule impacts to station construction of voids that formed around the tunnel liner during tunnel excavation in the Chinatown (CTS) Station area remain to be resolved. The tunnel contractor and tunnel designer have been tasked with preparing white papers identifying the possible causes of these voids. *These white papers continue to be overdue. SFMTA is holding $850,000 in retainage on the 1252 contract to cover additional costs that may be claimed by Tutor Perini Corporation (TPC). The 1252 Contract will be closed out after the cost impacts to the 1300 Contract are resolved.*

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 January 2018, the construction of the Stations and Surface, Track, and Systems Contract was 65.93% complete based on cost and 67.49% 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. Thus far, few of the identified BHAGs have been achieved. See Table 5 on Page 15 for the current status of BHAGs. The following paragraphs describe ongoing work for each construction package.

Union Square/Market Street Station (UMS): *Installation of stair 1 and work on the vent shaft walls are underway at the Union Square Garage entrance. Restoration of the north side of Geary Street*

adjacent to the entrance was completed in late February. Encasement of permanent walers and struts is continuing in the station box. Scallop walls are being poured on either side of the station box. Completion of the scallop walls will allow track to be placed through the station. Issues with the structural interfaces between the station walls and the headwalls placed by the tunnel contractor need to be addressed before the final wall sections can be completed. Work on the emergency exit stairs at O'Farrell Street was delayed again and is now expected to continue through March. Final street and sidewalk finishing at Ellis Street continued at the southeast corner. Final completion of the southwest corner continues to be delayed pending delivery of a traffic controller and final placement of traffic control conduits. Completion of the rest of the intersection will involve relocation of curb ramps on Market Street and completion of sidewalk brick pavers on the southeast corner. Work to close the south concourse opening in the roof in Stockton Street was completed in February. Closure of the opening will allow final utilities to be placed under Stockton Street, followed by street restoration and turnover by the contractor of the street to the City for use by traffic and pedestrians.

Chinatown Station (CTS): *At CTS, excavation of the crossover cavern was completed in February. Removal of excavation soils is complete except for a small volume of material being used for construction ramps connecting the headhouse to the cavern area. In the headhouse, preparations for placement of the invert slab are underway. Due to water leaks occurring at YBM, SFMTA is considering supplementing the waterproofing system at CTS. The designer also has identified a need for an additional layer of reinforcing in the 7-foot thick invert slab. The slurry walls will need to be cored so that dowels to later connect the additional reinforcing can be installed. It appears that the BHAG for placement of the slab by March 31 will be missed. Preparations for placement of the final invert of the north platform cavern are underway, and the concrete is scheduled to be poured by March 23. Cleanup and smoothing of the crossover cavern is complete, and waterproofing is being installed for the invert. Placement of the invert concrete is scheduled to be complete by the end of March.*

Yerba Buena/Moscone Station (YBM): *Utility work continues to progress slowly at the intersections of 4th Street with Howard Street and Folsom Street. Placement of Pacific Gas and Electric Company (PG&E) power boxes is being delayed by issues with the location of the penetrations of the slurry wall for the power conduits. Slow response by the designer to the identified issues has been a problem. Construction of emergency stair 4 at 4th and Howard streets continued to be delayed, with completion now expected on March 29, six weeks later than forecast in early February. Finishing and Mechanical, Electrical, and Plumbing (M/E/P) work also continues in the station box at all three levels and at the lowest level of the headhouse. Significant water leaks are impeding the progress of work in the headhouse. The contractor is injecting hydrophilic grout to mitigate the leaks but the work is proceeding slowly. The contractor is encouraging the subcontractor to add crews to speed up the work.* ***The PMOC is concerned that, based on experience at the South Ferry Station in Manhattan, complete repair of the water leaks may be difficult to achieve.*** *Preparations for placement of the headhouse subsurface deck continue, with placement of the first section scheduled for March 27. This deck will likely be poured in March.* Lightweight fill will then be placed, followed by the surface deck. Once the

surface deck is placed, the contractor can vacate the construction staging area within the 4th Street right-of-way and turn it over to the City.

Surface, Track, and Systems (STS): Final street and sidewalk paving is complete along 4th Street between King Street and Brannan Street and from Brannan Street to Bryant Street. *Pavement renovation at 4th and King is awaiting negotiation of a contract change and approval of the traffic control plan (TCP). At 4th and Brannan, three private utility lines need to be relocated and a new water line needs to be connected by San Francisco Water Department (SFWD) before pavement renovation in the southwest and southeast quadrants can be completed. At 4th and Bryant, pavement restoration is awaiting review of the TCP by SFMTA Sustainable Streets Division (SSD). The review is taking an inordinate amount of time. After SSD approval, the TCP must be approved by the California Department of Transportation (Caltrans).* ***In the opinion of the PMOC, SFMTA management should assure that SSD is responsive to the needs of the CSP.*** *Caltrans also is requiring structural design calculations for the planned attachment of Overhead Contact System (OCS) insulating material on the underside of the Interstate 80 bridge at 4th and Bryant streets. A contract for design, installation, and testing of the Automated Train Control System (ATCS) was assigned to the 1300 Contract. The schedule for completion of the ATCS work has been a point of conflict between TPC and SFMTA. SFMTA has informed TPC of its intent to de-assign the contract and manage the ATCS completion itself.*

In the tunnel section of the project, track in both tunnels has been installed to UMS. Installation of track through UMS and on to CTS is awaiting completion of the platform-level station walls. Meanwhile, the walkways along the track are being installed in both tunnels working from the portal to the north.

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

Bay Area Rapid Transit (BART)

SFMTA has received comments on the shop drawings for installation of escalators and elevators at the Ellis Street annex after the contractor paid the required BART permit fees. Work in this area can now proceed.

California Department of Transportation (Caltrans)

SFMTA needs an Encroachment Permit to install electrical and traffic signal equipment at the I-280 off ramp. *Permit issuance is pending TCP and design approval.*

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), including the February 7 QPRM. The FLSC is working to approve items on the certifiable items list for the Stations Contract. SFMTA has expressed concern that CPUC may have insufficient staff to witness the required safety tests for CSP, which could further delay the Revenue Service

Date (RSD). The PMOC recommends that this potential risk be monitored in the risk register and mitigation strategies be developed.

San Francisco Public Utilities Commission (SFPUC)

No updates to report.

San Francisco Department of Public Works (SFDPW)

SFDPW inspects completed street and sidewalk facilities that the contractor has proposed to release to the City. SFDPW develops punch lists of required repairs that must be completed by the contractor prior to acceptance of the streets and sidewalks.

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 4 Light Rail Vehicles (LRVs) for the Central Subway, 24 LRVs for near-term fleet expansion (4 for service to the new Warriors Arena), and 151 LRVs for fleet replacement. Options for up to 85 additional vehicles are available for fleet expansion. SFMTA had received eight cars as of November 30, 2017. The third LRV was expected to be approved to enter revenue service in February. *Eight additional cars have been delivered and are being tested.* SFMTA has identified which of the new cars will be assigned as being funded by the CSP and will provide information on the date they are placed into revenue services for ongoing tracking of these assets in which the federal government has a financial interest.

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 December 31, 2017. SFMTA contract goals range from 6% to 30% on each of the contracts. The majority of the contracts have met these goals to date.

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

The 1300 contractor had previously raised the possibility of Buy America compliance issues with cooling equipment for the three underground stations. In the case of the cooling equipment, the contract specifications for the Variable Refrigerant Flow (VRF) cooling units identify four manufacturers that are all foreign, and the contractor has not been able to identify a domestic supplier that can meet the specifications. SFMTA has applied for a waiver of Buy America requirements for this equipment, which is under review by FTA.

B. PROJECT MANAGEMENT PLAN AND SUB-PLAN IMPLEMENTATION

Project Management Plan (PMP)

SFMTA delivered an update of the PMP in April 2017 and expects to provide an updated PMP to FTA in April 2018.

Environmental Assessment/Mitigation Plan/Archaeological Plans

The PMOC received the Second Quarter 2017 Mitigation Monitoring Reporting Program (MMRP) update from SFMTA on October 26, 2017. The PMOC reviewed this document and identified minor inconsistencies regarding the current status of some monitoring items and the timing of future project development steps due to construction delays. The PMOC has forwarded recommendations to address these inconsistencies to SFMTA for incorporation into the next MMRP update. *SFMTA expects to deliver the Third Quarter 2017 MMRP soon.*

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

The CSP Program Director, John Funghi, left the project effective February 1, 2018. SFMTA announced that Albert Hoe, the Deputy Program Director has been appointed as the Acting Program Director. Mr. Funghi plans to be available for approximately 8 hours per week to assist with the resolution of outstanding contract issues with TPC. *He also has been attending Dispute*

Review Board (DRB) hearings and key meetings addressing contractual issues between SFMTA and TPC.

New Resident Engineers (RE) have been assigned to the CTS and UMS work packages. The new REs demonstrated good control of recent work package status meetings attended by the PMOC. SFMTA is transitioning the STS work package to a new RE, as the utility and street restoration nears completion and track and systems work ramps up. SFMTA's efforts to hire a Start-up and Testing Manager were delayed while the team reached out to the SFMTA operations department for input on the position description. CSP and SFMTA operations management will jointly review applicants and agree on the decision on who to hire for this key project role. **The PMOC supports engaging SFMTA operations management in the hiring process for the Start-up and Testing Manager, who will be responsible for assuring that operating needs are addressed in the testing, commissioning, training, and start-up activities of the project.**

Turnover in key project management staff positions will make it challenging to resolve outstanding contractual issues between SFMTA and the contractor while effectively managing ongoing construction. In the opinion of the PMOC, SFMTA should implement its plan to fill critical project management positions immediately.

The PMOC has been reporting for several months that the REs have been challenged to address the high volume of open contractor change requests requiring merit determination, completion of negotiations for merited changes, and completion of the necessary paperwork to execute changes that have been negotiated. *As of January 31, no contract modifications had been issued since September 2017, despite the fact that hundreds of trend items had been determined to have merit and should have been advancing to the contract modification stage.* SFMTA reported that both the agency and contractor had been focusing on preparations for DRB hearings and had been unable to address other more routine contract issues. **This is further evidence that both the contractor and SFMTA have insufficient staff resources to address the large number of contract issues affecting the project.** ***The PMOC supports the concept of assigning dedicated contract change management resources to the 1300 Contract.*** *The CSP organization chart now shows full-time contract modification (CMod) support staff members for each of the four work packages. The latest trend summary, dated March 7, 2018, indicates that three new CMods have been executed for about $240,000 overall.*

SFMTA reported that it is continuing recruitment efforts for other open management positions. SFMTA further reported that execution of agreed contract changes has been hampered by difficulties associated with the City of San Francisco's change to a new financial accounting system. Budgets for CSP project components are not accurately reflected in the new system, causing difficulties in implementing contract changes. The PMOC will continue to monitor the SFMTA's progress in clearing the backlog of pending change orders.

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 CMod. The NOPC log and the Claim Log include CORs rejected by SFMTA for which the contractor expects to submit or has submitted a claim.

The most recent versions of the Trend Log and Trend Summary documents are dated March 7, 2018. The Trend Summary indicates that 78 contract modifications had been executed for the 1300 Contract. The total value of executed CMods was $8,359,906 ($240,000 increase since January). The NOPC log, dated March 5, 2018, indicates that there are now *80 potential claims (three additional since January).* The Claim Log shows that 62 of these potential claims have been certified and submitted by the contractor and two have been resolved and will be addressed through contract modifications. The submitted claims total $29.98 million in extra costs, which is unchanged from January.

Note that Tables 2 and 3 reflect the project status as of the end of January 2018 as reported in SFMTA's latest Monthly Progress Report (MPR), and show substantially different values for potential contract changes because of the differing data dates and because pending contract changes in Tables 2 and 3 include only SFMTA-initiated PCCs and contractor CORs that have been determined to have merit. Claims and denied CORs are not included in the cost forecast in Tables 2 and 3.

Project Cost (*as of January 31, 2018*)

Cost estimate: $1.5783 billion.

Total contingency: $74.18 million (minimum contingency is $60 million), no change from December.

Actual Cost (AC): *$1,178,423,883, an increase of $14.16 million from December (74.66% of the total project budget).*

Current funding level: $1,479,780,000 (93.6% of the total project budget).

Earned Value (EV): *$1,178,387,158, an increase of $10.56 million from December (74.66% of project value earned).*

Cost Performance Index (CPI): *1.00.*

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.

Project Cost Trends

SFMTA tracks potential changes in project cost, calling these potential changes "trends." Trends include all potential changes in a contract's 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. SFMTA's latest forecast for close out of Contract 1252 indicates that additional credits will be extended by the contractor leading to a reduction in final contract value**. It appears likely that additional contingency from Contract 1252 will be available for reallocation to unallocated contingency.**

In the January MPR, SFMTA estimates the total cost impact of potential changes to the 1300 Contract at $24.65 million, compared with $23.67 million in December, an increase of about $1million. After potential changes were accounted for, $7.23 million in allocated contingency remained for Contract 1300 at the end of December. **The resulting contingency of 2.5% of potential remaining spending on the 1300 Contract after potential changes are accounted for is likely insufficient, and additional contingency will probably need to be allocated to this contract prior to completion. The available unallocated contingency and excess contingency for other elements of the program are likely sufficient to allow on-budget completion of the CSP**.

Table 3 shows the overall budget, trends, and contingency status for the entire Central Subway program. *The Budget Forecast Variance, which reflects the total remaining contingency after the cost of trends is accounted for, is 14.1% of the potential remaining spending. In the opinion of the PMOC, this contingency should be sufficient to provide reasonable confidence in an on-budget completion of the project.*

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	8,121,713
Current Contract (1252 does not include non-project costs)	235,078,785	847,798,113
Remaining Contingency	834,715	31,878,287
Potential Changes (PCCs and merited CORs)	20,000	*24,649,627*
Estimate at Completion	235,098,785	*872,447,740*
Contingency Less Trends	814,715	*7,228,660*
Spent to Date	233,589,322	*579,943,262*
Potential Left to Spend	1,509,463	*292,504,478*
Contingency Less Trends as % of Potential Cost to Complete	54.0%	*2.5%*

[1] *As reported in the January 2018* Central Subway Project Monthly Progress Report – SFMTA (reformatted by the PMOC).

Table 3 - Budget and Contingency Status for Central Subway Project

SFMTA Central Subway Project, Budget, Costs and EAC by SCC January 31, 2018		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%**			**262,256,539**	92%	**22,971,340**			
10.02	Guideway: At Grade, Semi-exclusive	2,395,143	464,857	2,860,000	19%			1,877,500	66%	982,500			
10.06	Guideway: Underground cut and cover	74,407,195	(4,590,788)	69,816,407	-6%			63,402,177	91%	6,414,230			
10.07	Guideway: Underground tunnel	224,933,257	(23,592,511)	201,340,746	-10%			187,629,946	93%	13,710,800			
10.09	Track: Direct fixation	7,293,157	(532,068)	6,761,089	-7%			5,747,916	85%	1,013,173			
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%			3,599,000	81%	850,637			
20	**Stations, Stops, Terminals, Intermodal**	**432,698,735**	**153,963,624**	**586,662,359**	**36%**			**379,303,211**	65%	**207,359,148**			
20.01	At-grade station	774,913	6,827,944	7,602,857	881%			1,978,488	26%	5,624,369			
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	142,371,764	554,456,652	35%			370,246,012	67%	184,210,640			
20.07	Elevators, escalators	19,838,934	1,862,903	21,701,837	9%			7,078,711	33%	14,623,126			
40	**Sitework and Special Conditions**	**232,551,627**	**(17,860,689)**	**214,690,938**	**-8%**			**204,850,393**	**95%**	**9,840,545**			
40.01	Demolition, clearing, earthwork	8,887,028	3,468,587	12,355,615	39%			12,078,515	98%	277,100			
40.02	Site utilities, utility relocation	29,562,587	31,257,647	60,820,234	106%			67,242,146	111%	(6,421,912)			
40.03	Haz. Material, contam'd soli removal, ground water treatment	2,957,442	4,576,686	7,534,128	155%			6,134,721	81%	1,399,407			
40.04	Environmental mitigation	3,146,216	(2,023,317)	1,122,899	-64%			687,590	61%	435,309			
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%			3,024,226	31%	6,766			
40.07	Automobile, van, bus accessways, including roads and parking lots	11,919,550	(5,340,451)	6,579,099	-45%			4,807,283	73%	1,771			
40.08	Temporary facilities and other construction indirect costs	158,790,820	(45,009,283)	113,781,537	-28%			108,169,481	95%	5,612,0			
50	**Systems**	**108,429,774**	**(13,087,948)**	**95,341,826**	**-12%**			**30,517,369**	**32%**	**64,824,457**			
50.01	Train control and signals	37,447,116	(9,319,177)	28,127,939	-25%			7,459,819	27%	20,668,120			
50.02	Traffic signals and crossing protection	3,013,232	9,549,297	12,562,529	317%			11,052,113	88%	1,510,416			
50.03	Traction power supply	20,379,634	1,085,439	21,465,073	5%			9,621,927	45%	11,843,146			
50.04	Traction power distribution	16,239,951	(3,798,838)	12,441,113	-23%			1,681,354	14%	10,759,759			
50.05	Communications	28,545,305	(16,514,719)	12,030,586	-58%			549,303	5%	11,481,283			
50.06	Fare collection system and equipment	2,804,536	3,295,464	6,100,000	118%			152,852	3%	5,947,148			
50.07	Central Control		2,614,586	2,614,586	NA			1	0%	2,614,585			
Subtotal (10 - 50)		**1,089,606,217**	**92,316,785**	**1,181,923,002**	**8%**	**1,148,050,000**	**33,873,002**	**876,927,512**	**74%**	**304,995,490**	**295,792,116**	**1,172,719,628**	**9,203,374**
60	**ROW, Land, Existing Improvements**	**37,398,029**	**(5,151,708)**	**32,246,321**	**-14%**	**32,246,321**	**-**	**30,732,020**	**95%**	**1,514,301**	**1,514,301**	**32,246,321**	**-**
60.01	Purchase or lease of real estate	33,798,029	(3,732,219)	30,065,810	-11%	30,065,810	-	28,322,590	94%	1,743,220	1,514,301	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**	**10,598,347**	**40%**	**15,787,306**	**2,710,653**	**13,309,000**	**13,076,653**
70.01	Light Rail Vehicles	26,385,653	-	26,385,653	0%	13,309,000	13,076,653	10,598,347	40%	15,787,306	2,710,653	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**	**260,166,005**	**79%**	**68,573,116**	**50,352,037**	**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	69,566,912	68%	33,351,478	24,540,698	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	71,508,333	76%	22,545,360	14,493,482	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	-	4,497,714	55%	3,714,890	3,254,766	7,752,480	460,124
80.07	Surveys, Testing, Investigation, Inspection	234,036	699,064	933,100	299%	933,100	-	850,867	91%	82,233	29,955	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**	**54,335,839**	**1,569,294,097**	**4%**	**1,504,123,363**	**65,170,734**	**1,178,423,884**	**75%**	**390,870,213**	**350,369,107**	**1,528,792,991**	**40,501,106**
90	Unallocated Contingency	63,341,742	(54,335,839)	9,005,903	-86%		9,005,903		0%	9,005,903			9,005,903
Total Project Costs (10 - 100)		**1,578,300,000**	**-**	**1,578,300,000**	**0%**		**74,176,637**	**1,178,423,884**	**75%**	**399,876,116**	**350,369,107**	**1,528,792,991**	**49,507,009**

SCC Breakdown of Forecast Construction Costs Not Available

[2]Data reported in the *January 2018* 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 March 7, 2018. This report shows that 78 contract modifications have been approved for a net increase in the contract value of $8,359,906, which is up about $240,000 since January 31. CORs (generated by the contractor) that have been determined to have merit and PCCs (generated by SFMTA) have a combined potential cost impact of $19.70 million in increased contract value, about the same as on January 31, 2018. SFMTA expects to settle the outstanding CORs for less than the overall cost currently claimed by the contractor. SFMTA also expects to receive $6.00 million in non-project funds to cover the cost of these pending contract changes. *The expected net impact of the CORs and PCCs on the potential project cost is $13.70 million.*

An additional 741 items are being tracked in the Trend Log. Of these, SFMTA judged 362 items to be without merit and denied them. A further 299 items have been voided and are carried at no cost. There are 80 items covered by certified claims and NOPCs by the contractor ($30.97 million total exposure), and 15 items are "open" or "new" and awaiting a determination of merit.

The potential exposure of the project to additional costs from the denied items, NOPCs, claims, and open items is $38.91 million, which, when added to the $13.70 million in increased project costs from merited contract changes, yields a possible exposure of the project to additional costs for the 1300 Contract of $52.61 million. This compares to the remaining contingency for the project of $73.94 million. **In the opinion of the PMOC, the available cost contingency for the CSP remains sufficient to address potential cost increases.**

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

1. # 24 - Change to grade 50 steel from specified grade 70 steel (due to availability issues) - $572,884
2. # 36 - Extra trucking costs for contaminated soil at CTS - $2,274,225
3. # 39 - Harder rock than anticipated for CTS slurry wall excavation - $1,880,379
4. # 61 - Delays to installation of tangent piles at UMS - $1,082,380
5. # 160 - Conflicting duct bank at UMS - $581,837
6. # 176 - UMS Garage underpinning requirements - $732,157
7. # 192 - 12-inch waterline at UMS, added scope - $336,236
8. # 239 - Changes in construction sequence for UMS Garage - $500,000

9. # 246 - UMS art glass installation requirements - $690,017
10. # 272 - Obstructions to jet grout placement at UMS - $2,060,001
11. # 341 - Change in track switch machine manufacturer at STS - $347,670
12. # 399 - Additional monitoring instruments at CTS - $429,777
13. # 466 - Extra work to prepare existing tunnel - $431,423
14. # 498 - Additional traffic control requirements at 4th and King - $500,001
15. # 524 - Changed requirements for pre-loading of UMS concourse level struts - $1,319,593
16. # 526 - Incomplete interface design at STS - $300,001
17. # 528 - Additional traffic control requirements for STS work package - $1,032,302
18. # 537 - Cost of changes to the design of CTS to accommodate the plaza requested by the community - $4,500,001 (paid from non-project funds)
19. # 543 - Change in construction sequence at CTS - $250,001
20. # 580 - Missing conduit between manholes at UMS - $250,001
21. # 636 - Changes in emergency vent design (all stations) - $500,001
22. # 644 - Contractor-claimed change in contract requirements for pre-loading permanent struts at UMS - $1,853,352
23. # 695 - Change in scope for slip-lining of 78-inch sewer on 4th Street - $800,016
24. # 715 - Soil nail and shotcrete wall changes in Union Square Garage - $1,365,378
25. # 840 - Change in drain piping details at UMS - $332,252
26. # 942 - Change in automatic train control system for reverse running - $400,000
27. # 968 - Design changes for UMS vertical drainage slots - $603,910
28. # 1022 - Claim for extra costs and time due to extremely hard ground claimed by TPC during the coring for the Sequential Excavation Method (SEM) mining work - $862,720
29. # 1032 - Escalator raceways at UMS - $492,065
30. # 1099 - Extra costs for SEM excavation at CTS due to tunnel segments being 5 feet long - $4,404,329
31. # 1117 - Extra costs due to concrete obstruction at CTS south platform cavern - $583,623
32. # 1175 - Time impacts due to power pole conflict during demolition at CTS - $3,516,164
33. # 1211 - Time impacts from extended submittal reviews and substitution request procedures - $3,021,262
34. # 1217 - Claimed delays to SEM work at the platform invert due to compensation grout exclusion zone requirements in the contract specifications - $900,889

35. # 1276 - Estimated extra costs of proposed scope increase to provide sidewalk bulb-outs at 4th and Bryant and 4th and Harrison - $1,500,000 (paid from non-project funds)
36. # 1299 - Claimed extra costs for a schedule delay to the train control subcontract - $2,000,001
37. # 1311- Claimed extra costs for delays to the CTS south platform center drift excavation due to restrictions caused by compensation grouting - $675,952
38. # 1373 - Extra costs for jet grouting complications at Macy's basement at UMS - $500,001
39. # 1378 - General claimed extra costs for SEM work at CTS - $5,457,322
40. # 1424 - Extra work due to changes in form-savers and couplers at roof to wall connection at YBM - $250,001
41. # 1479 - Large volume of water inflow at end of probe - $300,000
42. # 1571 – Increase in allowance for DRB costs - $250,000 (new)

The PMOC notes that there were no new trends with costs in excess of $250,000 in the current month.

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)
3. Replace specified Closed Circuit Television (CCTV) equipment with alternate for all stations - ($1,600,000)

Funding

Federal, state, and local project funding and expenditures are shown in Table 4. The awarded funding now represents 93.8% of the project budget.

Table 4 - Project Funding

Source	Committed ($1,000)	Awarded ($1,000)
Federal		
New Starts	942,200	919,182
Congestion Mitigation	41,025	41,025
Federal Subtotal	983,225	960,207
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**	**1,479,780**

E. PROJECT SCHEDULE STATUS

SFMTA prepared an update of the master program schedule in February representing progress on the project through January 2018. SFMTA continues to reject schedule updates from the contractor. SFMTA has directed the contractor to make corrections to the schedule logic, but the contractor has not complied with this direction. As a result, the schedule forecasts for the project are based on SFMTA's version of the schedule.

As of the end of January 2018, the project was 331 days late, based on the projected RSD of November 22, 2019. The projected substantial completion date for the 1300 Contract is now forecast on June 12, 2019, which is 488 days later than the original date (February 9, 2018). The latest schedule update indicates a savings of 14 days in the projected substantial completion date and an improvement of 18 days in the forecast RSD. Excavation work at CTS was completed as expected in the second week of February. A schedule BHAG has been established to complete the CTS headhouse invert slab by March 31, which would *maintain the time savings achieved in the last reporting period.*

Major delay claims and NOPCs by TPC for CTS and the other work packages are pending resolution. SFMTA and TPC have been addressing the claims through the DRB process and executive level meetings. The schedule for installation and testing of the ATCS is the subject of major delay claims, *and it is uncertain how delays to the ATCS work could impact the project critical path.* SFMTA has requested an updated schedule from the train control supplier, which has not been received. *Contractual issues with TPC are causing difficulty in coordination and management of the ATCS work. SFMTA informed TPC of its intent to de-assign the ATCS work from the 1300 Contract. TPC subsequently submitted a letter protesting the planned de-assignment of this work.* **The PMOC encourages SFMTA to quickly resolve the ongoing contractual issues regarding the schedule for and management of the ATCS to avoid schedule delays.**

DRB hearings have been conducted to address several major delay claims by the contractor. DRB opinions have been issued for some of the claims, and SFMTA is issuing CMods that extend the contract substantial completion date by 84 days, with extended contract overhead allowed for a portion of the days, consistent with the DRB findings with regard to schedule.

The critical path for the construction work now flows through the CTS headhouse concrete work, electrical activities, STS startup and testing, commissioning, and pre-revenue activities. Work at UMS is close to the critical path so that any delays at UMS or time-savings at CTS may cause a change in the critical path.

SFMTA and TPC have been establishing BHAGs as a way to focus the project team's attention on advancing project work and to encourage teamwork among SFMTA and TPC staff to removing barriers to completion of the work.

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

Table 5 - Interim BHAGs for Construction Progress

Milestone	Target Date	Actual Date	*Status*
CTS			
Complete headhouse invert	*3/31/2018*	*TBD*	*Excavation to invert complete*
Complete cavern final lining	*9/1/2018*	*TBD*	*Waterproofing started on north cavern*
Complete all concrete	*12/31/18*	*TBD*	
UMS			
Complete roadway restoration:			
• *Geary/Stockton*	*2/14/18*	*2/28/18*	*Complete*
• *O'Farrell/Stockton*	*3/15/18*	*TBD*	*Running late – April likely*
• *Ellis/Market*	*3/1/18*	*TBD*	*Running late – date uncertain*
Closure of roof openings:			
• *1A*	*5/1/18*	*2/2018*	*Early*
• *3B*	*8/11/18*	*TBD*	*Utilities need to be completed*
Stockton Street open to traffic from O'Farrell to Ellis	*5/1/18*	*TBD*	*Grade issues with sewer line to be resolved*
YBM			
All station finishes complete	*9/21/18*	*TBD*	*Need interim milestones to track progress*
STS			
Complete track installation and street work on 4th Street	*3/31/18*	*TBD*	*Will not be met*
Surface signal design complete	*2/20/18*	*TBD*	*Work not scheduled*
Track to CTS	*6/1/18*	*TBD*	*Track to UMS complete*
Tunnel walkway to UMS	*4/1/18*	*TBD*	*Walkway to UMS underway*

TBD: To Be Determined

In the opinion of the PMOC, the current BHAGs are meaningful milestones representing key elements of work for each package. Some of the BHAGs are far in the future and interim milestones will need to be set to assess progress toward achievement. To improve the effectiveness of the BHAGs in driving schedule performance, the PMOC recommends that the status of BHAGs be discussed at each work package status.

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. The PMOC issued a report documenting the results of the workshop and identifying action items relative to the schedule. SFMTA and the PMOC reviewed the status of the action items on October 17. The remaining open action items include:

1. Review and confirm schedule for procurement of ATCS hardware, software, and testing. The ATCS supplier is preparing an update of its schedule, which is pending. SFMTA is implementing contract actions that will give it more direct control over the ATCS work.
2. Conduct a risk assessment to identify a reasonable range for the RSD recognizing the schedule risks. *The PMOC met with SFMTA to review the current status of the risk analysis. SFMTA plans to make refinements to the analysis with the intent to complete the work in April. SFMTA plans to announce any revisions to the RSD forecast at the May QPRM.*
3. If SFMTA intends to pursue a Revenue Service Demonstration, prepare a plan that identifies the work that must be complete in order to start such a demonstration. Identify a range of dates by which the required work is likely to be complete. SFMTA does intend to pursue a Revenue Service Demonstration and is identifying what work will need to be complete, including staff training, to implement such a demonstration. SFMTA has initiated discussion with Muni operations on the requirements for the potential demonstration.

The PMOC supports SFMTA's planned approach to identifying a range for the RSD for the project.

Project Schedule Data

Earned Value (EV): *$1,178,387,158, an increase of $10.56 million from December.*

Planned Value (PV): *$1,482,093,391, a planned increase of $9.55 million from December.* The PMOC notes that because the baseline schedule projected Substantial Completion in February 2018, the planned earned value for each month going forward will be declining. Actual earned value each month should greatly exceed the planned earned value for the month for the remainder of the project.

Schedule Performance Index (SPI): *0.80.* 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 *0.80* indicates that the project is significantly behind schedule**.**

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

Table 6 - Schedule Milestones

	(P = Planned Date, A = Actual Date, F = Forecast Date)
Preliminary Engineering (PE):	Authorized in July 2002 (A)
Record of Decision:	Issued November 26, 2008 (A)
Final Design (FD):	Authorized in January 2010 (A)
FFGA Request:	Submitted September 2011 (A)
FFGA Executed:	October 11, 2012 (A)
Ground Breaking: (Utility Relocation Contract)	February 9, 2010 (A)
Tunnel excavation complete (hole through):	June 2, 2014 (SB); June 11, 2014 (NB) (A)
Cross passages complete:	December 20, 2014 (P); April 15, 2015 (A)
Tunneling substantial completion:	April 15, 2015 (A)
Station construction Notice to Proceed (NTP):	June 17, 2013 (A)
Station construction substantial completion:	February 24, 2018 (P); *June 12, 2019 (F)*
RSD:	December 26, 2018 (P); *November 22, 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 in 2009. The FTA recommended schedule contingency for the current stage of the project is 6.0 months. As noted above, the current schedule reflects about 11 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 *November 22, 2019*)

Three Month Look-ahead

The following activities are planned over the next three months:

1300 Contract

UMS

- *Complete utility placement, backfill, and paving of O'Farrell Street and Ellis Street at Stockton Street*

- Complete emergency exit stairs at O'Farrell Street
- Continue exterior finishing work at the plaza level of the Union Square Garage and the north entrance
- Continue below-grade construction in the north concourse fan plant
- Continue encasement of permanent walers and placement of interior walls in the main station box
- Install elevator in the BART annex
- Continue construction of interior walls in the south concourse

CTS

- Clean up platform, cross-cut, and crossover caverns and prepare for installation of final lining
- Start placement of final linings in the crossover and platform caverns
- Place the headhouse invert slab
- Continue construction of final lining for emergency exit at north end of station

YBM

- Install mechanical and electrical equipment at the invert level of the headhouse
- Remove temporary struts and shoring at the mezzanine level of the headhouse
- Install shoring and complete placement of the headhouse undersurface deck
- Continue construction of stairs within the station box and emergency egress stairs
- Continue M/E/P rough-in and interior work on the mezzanine and concourse levels
- Continue finishes work at the platform level
- Continue utility work at 4th and Howard Street and 4th and Folsom Street intersections above the station box
- Install escalators and elevators

STS

- Complete utility work and street restoration along 4th Street
- Complete construction of the trackway and installation of track along 4th Street
- Install track from YBM through UMS and on toward CTS
- Construct tunnel walkways
- Continue construction of surface level station

The PMOC expects to attend the following meetings:

- Weekly Management (April 2, May 7, and June 4, 2018)
- Weekly Contract 1300 Construction Progress Meetings (April 3/4, May 8/9, and June 5/6, 2018)
- Weekly Configuration Management Board (CMB) (April 4, May 9, and June 6, 2018)
- CSP PMOC Status Meetings (April 3, May 8, and June 5, 2018)
- CSP Risk Management Meeting (April 3, May 8, and June 5, 2018)
- FTA/QPRM (May 9, 2018)

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.

The quality concerns for the 1300 Stations Contract identified in the SFMTA January monthly report included issues identified in the previous month including:

- 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.
- Also as is typical, timely identification and response to construction problems such as too little concrete cover for reinforcing steel due to close proximity of adjacent objects remains a challenge.
- Schedule compression demands are disrupting RE and design staff priorities.

The PMOC followed up with the SFMTA Quality Assurance Manager (QAM) regarding the last comment. The QAM explained that the pressure to accelerate work in order to recover schedule delays was putting pressure on SFMTA field construction staff and the design team to respond quickly to submittals and RFIs and to approve planned concrete placements with limited time for reviews. Contractor submittals and other materials needed for concrete placements are being completed late, resulting in compressed time for reviews in order to avoid holding up work. The QAM expressed the opinion that the quality of completed work has not yet been compromised, but risks are increased due to the schedule pressure.

The SFMTA QAM conducted a surveillance of quality control related to the water leaks that have appeared in the YBM station. The surveillance did not identify any evidence that non-conforming work is responsible for the leaks. At the same time, the designer insists that the design is sufficient to prevent ground water intrusion. As a result of the leaks at YBM, SFMTA questioned the designer about how the waterproofing at CTS could be enhanced. The designer responded that although the CTS design is sufficient, a system of pre-installed grout injection pipes would enhance the ability to repair any leaks that might arise while minimizing delays to follow-on work. SFMTA is considering whether to adopt the design refinement. **The PMOC continues to recommend that the CSP management team assess the impact that schedule acceleration may be having on the quality program and make necessary adjustments to assure the effectiveness of the quality program.**

As of February 27, 2018, TPC's Quality Manager had filed 346 CNCRs (seven new since the last report). Seven new items were under review, 12 other items had responses identified but not yet approved, the proposed responses to 12 items were disapproved, and 12 items had approved responses that were not yet implemented. In addition, 256 items were closed (three more than on January 31) and 38 items had been voided.

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 Rail Activation Plan (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 was started to address the station construction items in 2016. *As of March 5, 2018, 222 of the 1660 items on the Safety and Security Conformance Checklist were approved and 19 items required follow-up responses from the SFMTA construction team.* 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 January 2018.* 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 January 2018	No. of Incidents	Incident Rate[1]	Goal
1300 Contract			
OSHA Recordable Accidents	6	*0.45*	<3.4
Job Transfer/Restricted Duty Incidents	0	0	NA
Lost Time Incidents	1	*0.08*	<1.6
Total Incidents	7	*0.53*	NA
Hours Worked	*2,653,016*		

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

I. PROJECT RISK, RISK MANAGEMENT, AND RISK MITIGATION

SFMTA conducts monthly meetings to review the status of identified risks, monitor the implementation of mitigation measures, identify new risks, and evaluate the probability and potential impacts of existing and newly identified risks. The current major risks to the project address the potential for further delays to the construction of the stations, which cannot be mitigated or recovered, resulting in further delays to the RSD. *At the Risk Mitigation meeting on March 6, 2018, these and other major remaining project risks were evaluated. The outcome of the risk meeting is documented in Appendix D.*

The PMOC noted the following significant items of discussion:

- *The top rated risk – delays due to lower than planned production rates for excavation at CTS – was retired. All excavation was completed in February. Two other risks related to the CTS excavation were identified for retirement next month. These risks were added costs and potential delays due to settlement from CTS excavation causing damage to utilities and adjacent buildings. Settlement of buildings was closely monitored, and compensation grouting was undertaken where necessary to keep building settlement within established tolerances. Monitoring indicates settlement was arrested and that the risk can be retired after a few more weeks where no further movement is detected. Settlement of the roadway and subsurface utilities was also monitored, and movements did not exceed the acceptable amounts identified in the contract specifications. Both risks will likely be retired next month.*
- *Another risk to be retired is the risk of higher costs and delays due to damage to buildings from jet grouting at UMS. The jet grout program was completed, and excavation has been completed for several months. Some damage to adjacent buildings occurred and will be addressed through the insurance program. No further damage is*

anticipated due to the grouting program, although risks of damage associated with other construction activities continues.

- *The risk that the contractor's quality program would fail to identify non-conforming work, resulting in delays and costs for re-work also will be retired. The contractor's quality program has been working well and there has been no resistance by the management team to issuing CNCRs when needed. A risk that the overall program fails to properly address non-conforming work will be retained.*
- *A newly identified risk – CPUC having insufficient skilled staff to witness required safety-related testing was rated. The overall rating was "6," putting this risk in the top 10% of all remaining program risks. Mitigations will be developed going forward.*
- *The PMOC noted during the meeting that recent events suggest that additional risk(s) should be identified and quantified. Water leakage at the YBM invert slab has caused delays (not to the critical path) and cost increases for hydrophilic grouting to mitigate the leaks. SFMTA is still investigating whether the leaks are due to improperly installed work or an inadequate design. In any case, delays are now being accrued at CTS while design for a modified waterproofing system is completed. The modified system also will increase the cost of CTS. The group agreed that new risks would be considered at the next risk mitigation meeting in April.*

SFMTA has been applying updated schedule risks to a Monte Carlo analysis of the program schedule in order to establish a range of likely construction completion dates and revenue service dates. *The initial results of the Monte Carlo analysis indicated that there is a 50 percent probability that the RSD will be on or before October 29, 2019, a significant improvement over the previous forecast of December 10, 2019. There is a 90 percent probability that the RSD will be on or before November 27, 2019. SFMTA's latest monthly progress report forecasts RSD on November 22, 2019. SFMTA plans to refine its schedule risk assessment further and publish a revised RSD forecast within the next two months. The PMOC will be reviewing the results of this schedule risk assessment once it is complete.*

In the opinion of the PMOC, SFMTA is taking an appropriate approach to identifying and quantifying the potential impacts of the remaining schedule risks to the project. The outcome of the SFMTA risk assessment is expected to be a range of likely RSDs for the project.

J. ACTION ITEMS AND RECOMMENDATIONS

Table 8 on the following page shows the current action items for SFMTA. Table 9 provides a summary of the currently active PMOC recommendations.

Table 8 - SFMTA Action Items for Central Subway Project

Category	NO.	ACTION	DATE OPENED	DUE DATE	DATE CLOSED	COMMENTS
S	**171**	Provide a range of dates for the Revenue Start Date	6/23/16	1/31/18	*TBD*	*SFMTA will finalize the Monte Carlo analysis in April.*
S	**177**	Develop plan, confirm feasibility of "Revenue Service Demonstration"	7/27/17	TBD	TBD	SFMTA is identifying requirements for the demonstration.
C	***178***	Recognize impact of schedule delays to project management costs	*11/14/17*	*2/1/2018*	TBD	SFMTA has started the process to update its forecast for project management costs.

(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.

Table 9 – Active PMOC Recommendations

Number	Date Identified	Recommendation
1	12/27/2017	SFMTA and the contractor should continue to use the DRB process as a tool to resolve contract disputes.
2	12/27/2017	Required cost and schedule contingencies should be reevaluated when CTS excavation is complete.
3	12/27/2017	SFMTA should further define the requirements for a possible "Revenue Service Demonstration," which could involve opening a portion of the line early. The definition of requirements will help to confirm the feasibility and timing of the proposed demonstration.
4	12/27/2017	The CSP Management Team should assess the impacts that schedule acceleration may be having on the quality program for the project and make any necessary adjustments needed to assure that quality is not compromised.
5	12/27/2017	The status of BHAGs should be discussed at each work package status meeting in order to improve the effectiveness of the goals in advancing critical project work.
6	12/27/2017	The trend log tracking should include the amount of time that has passed from the initial identification of the trend.
7	*1/10/2018*	SFMTA should immediately prepare and implement a plan for filling key positions, including the Program Director and Resident Engineer openings. The PMOC will monitor the agency's progress in recruitment and hiring of needed staff. *RE positions filled.*
8	*1/10/2018*	The baseline schedule for the Monte Carlo risk assessment should be updated to include any time-saving measures that have been implemented, thereby adjusting the baseline RSD date. *CLOSED*
9	*1/10/2018*	SFMTA should evaluate the current and future staffing levels and expertise required to address outstanding contract issues while effectively managing ongoing construction and preparing for systems testing and start-up activities. The PMOC supports the concept of assigning a dedicated claims management team, *which has been partially implemented.*
10	*1/10/2018*	SFMTA should work with the City to address problems in contract management associated with the switch to a new financial management system. *Some contract modifications have been executed.*

Number	Date Identified	Recommendation
11	1/10/2018	SFMTA should now focus on updating the risks and mitigation strategies to reflect the transition of the work from excavation and major structural supports to M/E/P and systems installation and testing. A specific risk of delays due to contractual issues with the ATCS system would appear to be a concern.
12	2/23/2018	The PMOC recommends that SFMTA quickly resolve the ongoing contractual issues regarding the schedule for and management of the ATCS to avoid schedule delays. SFMTA has been unable to obtain submittals for the ATCS design and equipment procurement, making it impossible to confirm the completion status of the work.
13	2/23/2018	The PMOC supports engaging SFMTA operations management in the hiring process for the Start-up and Testing Manager, who will be responsible for assuring that operating needs are addressed in the testing, commissioning, training, and start-up activities of the project.
14	2/23/2018	The PMOC recommends that the potential risk of CPUC having insufficient staff to witness required tests be monitored in the risk register and mitigation strategies be developed.
15	*3/11/2018*	*SFMTA executive management should assure that the Sustainable Streets Division is being responsive to CSP requirements.*

APPENDIX A. LIST OF ACRONYMS

AC	Actual Cost
ADA	Americans with Disabilities Act
APTA	American Public Transportation Association
ARS	Air Replenishment System
ATCS	Automatic 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
CCTV	Closed Circuit Television
CFR	Code of Federal Regulations
CLIN	Contract Line Item Number
CM/GC	Construction Manager/General Contractor
CMB	Configuration Management Board
CMod	Contract Modification
CNCR	Contractor Non-Conformance Report
COR	Change Order Request
CPI	Cost Performance Index
CPUC	California Public Utilities Commission
CQM	Contractor's Quality Manager
CSP	Central Subway Project
CTS	Chinatown Station
DF	Designated Function
DRB	Dispute Review Board
EV	Earned Value
FD	Final Design
FEIR	Final Environmental Impact Report
FEIS	Final Environmental Impact Statement
FFGA	Full Funding Grant Agreement
FLSC	Fire and Life Safety Committee
FMP	Fleet Management Plan
FRA	Federal Railroad Administration
FTA	Federal Transit Administration
IRP	Independent Review Panel
LONP	Letter of No Prejudice
LRT	Light Rail Transit
LRV	Light Rail Vehicle

M/E/P	Mechanical, Electrical, and Plumbing
MMRP	Mitigation Monitoring Reporting Program
MOU	Memorandum of Understanding
MPR	Monthly Progress Report
MPS	Master Project Schedule
Muni	Common Public Reference to SFMTA
NCN	Non-conformance Notice
NCR	Non-conformance Report
NEPA	National Environmental Policy Act
NOPC	Notice of Potential Claim
NTP	Notice to Proceed
O&M	Operations & Maintenance
OCS	Overhead Contact System
OHA	Operational Hazard Analysis
OP	Oversight Procedure
PCC	Proposed Contract Changes
PE	Preliminary Engineering
PG&E	Pacific Gas and 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
QAM	Quality Assurance 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
SSD	Sustainable Streets Division
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
TCP	Traffic Control Plan
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. CPUC attends monthly certification review meetings conducted by SFMTA.
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.

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**
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.
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		

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 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.
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. The status of safety and security certifications is reviewed at weekly project management 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 have been developed. Certification is achieved through monthly meetings. Design is complete and construction is underway.

Central Subway Project Overview			
Project mode (Rail, Bus, BRT, Multimode)	Light Rail Transit		
Project phase (Preliminary Engineering, Design, Construction, or Start-up)	Construction		
Project Delivery Method (Design/Build, Design/Build/ Operate/Maintain, CM/GC, etc.)	Design-Bid-Build		
Project Plans	*Version*	*Review by FTA/FRA*	**Status**
Has the grantee verified conformance with safety and security requirements 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
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 about 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.

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 demonstrated through meetings or other methods, the integration of safety and security in the following: ☐ Activation Plan and Procedures ☐ Integrated Test Plan and Procedures ☐ Operations and Maintenance Plan ☐ Emergency Operations Plan	*In Process*		Second draft of Rail Activation Plan has been completed. An Integration Matrix has been implemented for all disciplines including safety and security concerns.
Has the grantee issued final safety and security certification?	N		Project is in the construction phase.
Has the grantee issued the final safety and security verification report?	N		Project is in the construction phase.
Construction Safety			
Does the grantee have a documented/implemented Contractor Safety Program with which it expects contractors to comply?	Y		Health and Safety Construction Safety Standards Revision 3, June 27, 2012.
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.

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 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.
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:	*March 6, 2018*
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. Gertrina Reese

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. Vehicle manufacturing is underway and SFMTA has identified the four vehicles that will be considered to have been partially funded with CSP grant funds.
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

74.7% *Percent Complete Based on Progress* (*January 2018 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
$1,178.4 million	Amount of Expenditures at date of this report from Total Project Budget of $1,578 million
74.7%	Percent Complete based on Expenditures at date of this report
$9.00 million	Unallocated Contingency remaining
$74.18 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	*2Q18*	60	60
5	Hold Point 5 – Complete CTS / Tunnels systems inst. April 2018	*2Q19*	25	25
RSD	PMOC / FTA RSD	4Q19		
CURRENT TOTAL CONTINGENCY $74.18 Million				


central T subway
Lombard St.
COIT TOWER
Columbus Ave.
Washington Square Park
Union St.
TUNNEL ONLY - NO SERVICE
Broadway
Broadway Tunnel
The Embarcadero
Washington St.
Ferry Building
CHINATOWN
Stockton St.
Kearny St.
Montgomery St.
Battery St.
EMBARCADERO
California St.
Leavenworth St.
Bush St.
FOLSOM
FUTURE TRANSBAY TERMINAL
Post St.
MONTGOMERY
Market St.
UNION SQUARE/ MARKET STREET
J K L M N T
Mission St.
1st St.
N
POWELL
Howard St.
2nd 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
AT&T BALLPARK
King St.
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

Top risks were discussed at the March risk meeting as noted below.

Top Risks Discussed in the Previous Month:

Risk 248 *– Production rate for CTS SEM mining is lower than planned, resulting in further delays to critical path work. CTS mining work is now forecast to be complete in mid-February. This risk can be retired now that the SEM is complete. The project critical path should is being reassessed based on resequencing of tasks planned by the contractor.*

Risk 240 – Unresolved assignment of responsibility for schedule delays may lead to increased costs for the program. This risk continues to be a concern. The DRB process is being used to help resolve issues regarding responsibilities for delays. *SFMTA is issuing CMods to extend the substantial completion date consistent with the DRB findings. TPC has not accepted the DRB findings.*

Risk 251 – Activities required to complete the project scope are not identified in the schedule, resulting in the time required to complete the project being longer than currently forecast. Thus far, although TPC has been identifying additional activities in its schedule updates, none of the added activities have resulted in further delays to the forecast completion date. SFMTA's schedule updates are capturing differences between the activities in the baseline schedule and the work actually being completed.

Risk 234 and 52 – Unacceptable settlement occurs due to SEM mining at CTS, causing damage to buildings or utilities. These risks can be retired when the SEM work is complete and sufficient time has passed to allow the surrounding ground to respond to the excavation. Thus far, compensation grouting has been effective in returning the adjacent buildings to elevations that are within the established tolerances.

Risk 249 – Unable to re-sequence work that is currently shown as finish to start, resulting in an inability to recover from delays. Thus far, TPC has been able to offset recent delays by starting critical work early. *This has prevented further schedule slippage and has allowed a portion of the accumulated delay to be recovered.* SFMTA's schedule updates are capturing resequencing of work activities as they are implemented.

Risk 253 – Insufficient resources are available to complete the work as planned. There is a concern that the primary electrical subcontractor may not have sufficient manpower to complete the scheduled work. No mitigations for this potential shortfall in staff resources have been identified. Thus far, crew shortages have not been experienced.

Risk 238 **–** Quality program is ineffective in processing non-conformance items causing schedule impacts. The SFMTA QAM conducted a review of potential causes of water leaks at YBM and concluded that there is no evidence of a failure in the QA/QC process. However, SFMTA is considering potential enhancements to the waterproofing design at CTS, given the experience at YBM.

Risk 205 – Prolonged time to execute contract modifications may lead to poor relations between the REs and the contractor. *This risk continues to be a concern. A few CMods have been issued recently.*

Risk 229 and 230 – Risk that contractor and SFMTA systems testing and commissioning will take longer than currently planned. SFMTA is preparing a more detailed testing and commissioning plan, to include identification of required testing and the responsibilities for witnessing and approving the tests. This will be part of the updated RAP to be included in the updated PMP. SFMTA is working to bring on a testing and commissioning manager to lead this effort and is coordinating with Muni's operations department on the job description and hiring process.

Risk 99 – Breakdown in relationships between SFMTA and contractors results in increased claims and delays to the schedule. The relationship between TPC and SFMTA is strained. Executive partnering and the DRB are being used to help resolve disputes. The effectiveness of these strategies is in question. SFMTA continues to assert that the contractor is effectively progressing the work despite the seriousness of the disputes that have yet to be resolved.

Risk 95 – Subcontractor default results in schedule delays. A few defaults have occurred, but no impacts to schedule have resulted. This is an ongoing minor risk.

Risk PR78 – Delays in other SFMTA projects cause delays to the Central Subway. This continues to be a minor risk.

Risk 103 – Difficulty in obtaining required permits. This risk continues, as SFMTA has been unable to obtain the required Encroachment Permit for work at 4th and Bryant from Caltrans. Caltrans has been raising new issues as it reviews the permit application, including a new requirement for a structural evaluation of the proposed installation of insulation to protect the underside of the I-80 bridge from the OCS and LRV pantographs.

Risk 254 – *CPUC has insufficient staff to witness required testing. This new risk of delays due to insufficient CPUC staffing was rated moderate. SFMTA will identify mitigation measures.*

The PMOC recommends that SFMTA focus on updating the risks and mitigation strategies to reflect the transition of the work from excavation and major structural supports to M/E/P and systems installation and testing. A specific risk of delays due to contractual issues with the ATCS system would appear to be a concern. *The PMOC also suggested that a new risk related to the water intrusion issue at YBM be considered.*

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 *about 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 *about 2* years in the future.
Conduct System Integrated Testing with trains, including procedures and reports	TBD	TBD	TBD	Project is in construction, with RSD *about 2* years in the future.
Complete Testing Reports	TBD	TBD	TBD	Project is in construction, with RSD *about 2* years in the future.
Operating Plan, Rules, and Training				
Finalize Operating Plan	TBD	TBD	TBD	Project is in construction, with RSD *about 2* years in the future.
Finalize/revise SOPs, manuals, and rulebook as applicable	TBD	TBD	TBD	Project is in construction, with RSD *about 2* years in the future.
Operations Manuals	TBD	TBD	TBD	Project is in construction, with RSD *about 2* years in the future.
Staffing and Operations Plan	TBD	TBD	TBD	Project is in construction, with RSD *about 2* years in the future.
Training of O&M personnel	TBD	TBD	TBD	Project is in construction, with RSD *about 2* years in the future.
Emergency response plan, training, and drills	TBD	TBD	TBD	Project is in construction, with RSD *about 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 *about 2* years in the future.
Spare Parts Requirements	TBD	TBD	TBD	Project is in construction, with RSD *about 2* years in the future.
Maintenance Manuals	TBD	TBD	TBD	Project is in construction, with RSD *about 2* years in the future.
Maintenance Training	TBD	TBD	TBD	Project is in construction, with RSD *about 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 *about 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 *about 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 *about 2* years in the future.
Conduct Operational Hazard Analysis (OHA) and resolve other hazards/ vulnerabilities	TBD	TBD	TBD	Project is in construction, with RSD *about 2* years in the future.
Pre-Revenue Operations	TBD	TBD	TBD	Project is in construction, with RSD *about 2* years in the future.
Public Outreach				
Develop Safety Outreach Plan	TBD	TBD	TBD	Project is in construction, with RSD *about 2* years in the future.
Provide Community Outreach	TBD	TBD	TBD	Project is in construction, with RSD *about 2* years in the future.
Grand Opening Plan	TBD	TBD	TBD	Project is in construction, with RSD *about 2* years in the future.
Construction Close Out				
Close Out of Non-Conformance Reports	Ongoing	09/24/2019	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	09/24/2019	TBD	Punch list completion expected at final completion of 1300 Contract.
Certificates of Occupancy/Substantial Completion	TBD	06/26/2019	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 Safety Certifiable Item List (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	09/24/2019	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	10/11/2019		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	11/19/2019		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 *about 2* years in the future.
Third Party/Agency Approvals Necessary for Revenue Service	TBD	TBD	TBD	Project is in construction, with RSD *about 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.
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

LL#	Date	Phase	Category	Subject	Lesson Learned
					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.
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.

LL#	Date	Phase	Category	Subject	Lesson Learned
15	01-30-14	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	06-30-14	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.
17	04-10-15	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. Lesson: When the safety and structural integrity of a construction site depends on maintaining 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	04-10-15	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

LL#	Date	Phase	Category	Subject	Lesson Learned
					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. Lesson: Pre-planning and quick action to involve the appropriate parties resulted in satisfactory handling of the artifacts with minimal delays to the construction schedule.
19	05-11-15	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. Lesson: A process should be established to assure that the latest design information, including submittals and related designer notes, is available in the field and used to inspect reinforcing steel prior to concrete placement.
20	09-28-15	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: 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 the 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. Lesson: Effective pre-planning and mock-up assembly of complex trackwork, may allow the final assembly to be completed without the need for field adjustments and in less time than planned. This approach can mitigate the risks associated with the installation of complex custom track components in an operating transit line.
22	03-01-17	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. Lesson: Careful record keeping and

LL#	Date	Phase	Category	Subject	Lesson Learned
					preparation for dispute resolution can limit agency exposure to costs related to claims.
23	01-10-18	Design and Procure-ment	Claims	Quality Control of As-built Data for Procurement	The Central Subway had three major construction phases: Utility Relocation, Tunneling, and Stations/Track/Systems. Inaccurate as-built information from earlier construction phases has led to claims for differing site conditions during the construction of Stations/Track/Systems phase. For example, during the final design phase for the tunnel work, SFMTA agreed to a proposed change to tunnel segments defined in the preliminary engineering phase. The length of tunnel segments was changed from 4 feet to 5 feet except in areas with tight curves. The approved change in segment length was not captured in the final design documents for the stations contract, even though the change in tunnel design was made prior to completion of the station contract documents. When the stations contractor encountered 5-foot-long segments while mining for the platform and crossover caverns at the Chinatown Station, he issued a change order request to account for extra costs due to the need to change the excavation approach to handle the longer tunnel segments. The current claimed extra cost is $4.4 million. Lesson: Procedures should be established to ensure that approved design changes during construction of early phases of complex projects are accurately reflected in contract documents for follow-on construction phases. PMOC oversight should confirm that procedures are in place to capture changes in design during construction and to assure that changes are reflected in follow-on construction contract procurement documents.

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 *December 31, 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	$233.59 million; $6.2 million is paid from non-project funds
	% Expended	96.6%
	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	*$8.12 million*
	Current Contract Value	*$847.80 million*
	Expended to Date	*$572.08 million*
	% Expended	*67.5%*
	SBE Participation	*21.3%*
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	*$7,904,713*
	% Expended	*99.6%*
	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	$*39,949,948*
	Approved Change Orders	$1,626,722
	Current Contract Value	$*41,576,670*
	Expended to Date	*$40,248,246*
	% Expended	*96.8%*
	SBE Participation	*31.6%*
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	*$16,864,250*
	Approved Change Orders	*$368,002*
	Current Contract Value	*$17,232,252*
	Expended to Date	*$14,739,986*
	% Expended	*85.5%*
	SBE Participation	*26.2%*
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	*$65,684,199*
	% Expended	*77.1%*
	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	*$9,874,151*
	% Expended	*57.7%*
	SBE Participation	*29.3%*
Schedule:		
Issues or Concerns:		