MONTHLY REPORT
March 2016

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

Draft Report delivered to FTA on April 15, 2016
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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: *23 months*

EXECUTIVE SUMMARY

Project Description

The Central Subway Project (CSP) is constructing 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 light rail line along the densely populated 3rd Street corridor. It began revenue service 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 (SoMa), 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) will be procured for the CSP as part of a larger procurement that will replace the entire LRV fleet. Average weekday boardings are projected at 43,521 in 2030.

Project Status

The Full Funding Grant Agreement (FFGA) was signed on October 11, 2012. Design is complete, and the project has been under construction since February 2010. *At the end of February 2016, the project was 57.53% complete based on expenditures.* There was one active construction contract: 1300 Stations and Systems/Trackwork. The 1252 Contract for construction of the twin subway tunnels achieved final completion on May 15, 2015. Determination of the final contract cost and financial close out of the 1252 Contract is likely to take a few more months. The final contract price is likely to be close to the current contract amount.

The 1300 Contract was 41.11% complete on the basis of incurred cost at the end of February 2016. Substantial completion was originally scheduled for February 2018, *but the SFMTA February 2016 Monthly Progress Report states that the latest (rejected) contractor schedule update forecasts that the station construction work is trending about 10 months behind schedule, with substantial completion indicated to be on December 7, 2018. The contractor's January and February schedule updates were rejected and the schedule information for the project is based on the December 2015 schedule update.* **The Project Management Oversight Contractor (PMOC) is very concerned about the continuing unavailability of a reliable schedule update tool *resulting from the rejection of the contractors schedule updates and incomplete efforts by SFMTA to develop its own schedule forecasting tool.***

The contractor, Tutor Perini Corporation (TPC), was scheduled to meet with SFMTA to discuss the March schedule update on April 6 and SFMTA expected the contractor to make the necessary improvements to schedule logic so as to provide a reliable forecasting tool. Meanwhile, SFMTA's scheduling staff was continuing to create the as-built schedule record, including adding information on the dates for submittal receipt and responses. SFMTA reported that TPC had added a scheduler to its management staff, and SFMTA added two new staff to

support the project scheduling effort. ***In the opinion of the PMOC, the added scheduling resources should allow SFMTA to create and maintain a reliable project schedule that will support planning the upcoming work and resolving the responsibility for past schedule delays.*** The PMOC plans to convene a schedule containment workshop as soon as possible after SFMTA completes its schedule model refinements and updates to identify and evaluate potential schedule recovery strategies.

As a result of the forecast delay in the completion of station construction, the current program master schedule indicates that the Revenue Service Date (RSD) will be achieved on May 24, 2019, five months later than the date required in the FFGA. The entire schedule contingency in the program master schedule has now been consumed by the delays to the station construction, and the project schedule now has negative float. *SFMTA and the contractor have established new goals for completion of construction milestones for each of the work packages. The milestone set for CTS construction would result in a reduction of the overall delay to completion of that work package of one to one and a half months. Since CTS is driving the construction completion date, the time saving could result in recovery of some the forecast delay to the RSD.* ***In the opinion of the PMOC, setting of such milestone targets has yet to result in recovery of previous schedule delays, so the effectiveness of setting the latest goals is uncertain.*** *SFMTA believes that the contractor is more focused on schedule performance than in the past and is optimistic that the latest milestone goals will be achieved.* ***In the opinion of the PMOC, the opportunities to recover the accumulated schedule delays will be more limited as time passes, so the effectiveness of the latest goals in reducing construction duration should be closely monitored.***

Table 1 - Core Accountability Items

Project Status: *(as of February 29, 2016)*		**Original at FFGA:**	**Current Estimate:**
Cost	Cost Estimate	$1,578,300,000	$1,578,300,000
Contingency	Unallocated Contingency	$74,722,000	$24,519,456
	Total Contingency (Allocated Plus Unallocated, Including Approved Contract Changes)	$185,500,000	$83,034,856
Schedule	Revenue Service Date	12/26/2018	05/24/2019 (forecast)
Total Project Percent Complete	Based on Expenditures	*57.53%*	
	Based on Earned Value	*59.32%*	

Major Issues	Status	Comments/Planned Action
Schedule Contingency	Based on the latest program master schedule, there is negative schedule float of at least 5.0 months.	The minimum schedule contingency agreed to at this stage of the project is *6.0* months. SFMTA indicates that the station work continues to fall behind schedule due to critical path work not being completed as planned. The PMOC will convene a schedule containment workshop as soon as SFMTA produces a reliable schedule analysis tool.
Cost Contingency	The current Total Contingency is *$83.0* million. The FTA recommends a minimum contingency level of $60 million.	The availability of excess cost contingency may make it possible to implement strategies to accelerate the construction work that could increase project cost.
Technical Capacity and Capability	All management positions in the organization are filled, however a key senior manager is on Family Medical Leave.	The PMOC is assessing the effectiveness of the SFMTA CSP team in managing the project through routine on-site monitoring.
Date of Next Quarterly Meeting:		May 5, 2015

Earned Value (EV): *$936,198,133, an increase of $11.23 million from January.*

Planned Value: *$1,174,792,723, an increase of $12.54 million from January.*

Actual Cost: *$907,951,763, an increase of $14.25 million from January.*

Cost Performance Index (CPI): 1.03. A value greater than 1 means that value of the work completed is more than the cost of the work (under budget) and less than 1 means that the value of the work is less than the cost of the work (over budget). SFMTA believes that TPC is under-reporting actual costs, thereby resulting in an overstated CPI.

Schedule Performance Index (SPI): 0.80. SPI greater than 1 is ahead of schedule and less than 1 is behind schedule. SFMTA has identified the minimum acceptable SPI to be 0.90; the current SPI indicates unacceptable schedule performance.

The SPI remained unchanged from January to February 2016, indicating that there was no progress in recovering from the accumulated delays. SFMTA reported that the SPI for the 1300 Contract was 0.64, indicating that the contractor had completed less than two-thirds of the planned construction work through February 2016.

Contingency

Cost Contingency

The total available contingency (approved contingency less approved contract changes) is $83,034,856, which is above the minimum required contingency of $60 million and unchanged from January. Unallocated contingency remains at $24.5 million. **In the opinion of the PMOC, the overall available cost contingency is sufficient to provide reasonable assurance of on-budget completion of the project. However, the accumulated delays to the construction raise the potential for contractor time impact claims and associated extra costs. To date the contractor has not demonstrated that SFMTA has any responsibility for the delays.**

Schedule Contingency

The Program Master Schedule for the Central Subway Project now shows negative buffer float and a forecast RSD five months later than required. *Schedule updates have not been prepared for two months due to rejection of the CN 1300 schedule update and incomplete efforts by SFMTA to create its own schedule forecasting tool. This has precluded preparation of an accurate forecast of the completion date for construction.* The agreed level of schedule contingency after demobilization of the tunnel work is 6.0 months. ***In the opinion of the PMOC, there is a risk that the RSD will be missed by a few months.***

PMOC Observations, Opinions, and Concerns

The latest program master schedule is now two months out of date. The PMOC is very concerned about the lack of an accurate estimate of the status of the current work and the lack of a reliable forecast of the time required to complete construction and open the project for revenue service. SFMTA should enhance its efforts to create an appropriate scheduling tool for the project. Table 8 in the main body of this report includes three action items related to the development of the schedule tool and preparation of a Recovery Schedule for the project. SFMTA missed the planned date for the first action item, and the PMOC is monitoring progress toward completion of these action items. *The addition of project staff by SFMTA should improve the CSP Team's ability to track and forecast schedule performance and to resolve the outstanding and future issues associated with contract changes.*

The most recent program master schedule forecast that the RSD would be five months later than planned. New schedule performance goals, if achieved, could save one to one and a half months of construction time. Setting of schedule performance targets has yet to be effective in recovering accumulated schedule delays, so progress toward the new goals should be closely monitored.

In the opinion of the PMOC, it is unlikely that the project can achieve sufficient improvements in work productivity and/or extended work shifts and additional crews to recover from all of the accumulated delays and meet the required RSD of December 2018. The contractor has yet to achieve the production levels assumed in the baseline schedule. The PMOC will convene a second schedule workshop as soon as SFMTA completes the update and enhancements to its schedule model. The purpose of the workshop will be to identify and evaluate schedule recovery

strategies with the objective of determining how much of the slippage in the RSD can reasonably be expected to be recovered.

In the opinion of the PMOC, the delays to construction due to unforeseen utilities, underground storage tanks and other conditions at UMS should largely be over. Once the roof deck is complete at the O'Farrell intersection, excavation should be able to proceed without interruption.

In the opinion of the PMOC, the trend and change management summary reports now being published by SFMTA improve the accuracy of forecasts of cost at completion and should help to expedite the completion of the contract modification process for justified contract changes. Based on the latest information from these reports, the total cost contingency, including unallocated contingency and less identified trends, of *9.7%* of the potential remaining spending is sufficient to provide reasonable assurance of on-budget completion of the project. The available contingency is well above the recommended minimum of $60 million. However, if efforts to recover the accumulated schedule delays are unsuccessful, there is a potential for increased project cost. To date the contractor has not demonstrated that SFMTA is responsible for any of the accumulated delays.

In the opinion of the PMOC, unallocated contingency will likely need to be transferred to the 1300 Contract before work is complete. The approved and identified potential changes for the contract total about *$24 million,* which is higher than the $20 million allocated contingency for the contract. *An additional $9 million in trends is being tracked by SFMTA as possible contractor claims that could further increase project costs.*

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A. PROJECT STATUS

Full Funding Grant Agreement (FFGA)

The FFGA was signed on October 11, 2012.

Design

Design is complete.

Construction

Contract 1250 (UR #1). This contract relocated utilities within the footprint of the proposed YBM Station, and work is complete. All cost claims by the contractor have been settled.

Contract 1251 (UR #2). This contract relocated utility lines within the footprint of the proposed UMS Station and temporarily rerouted existing trolley coach lines around the construction zone. The work is complete. There is an outstanding cost claim by the contractor for this contract.

Contract 1252 Tunnel. This contract completed the construction of 1.5 miles of twin tunnels by tunnel boring machines and the tunnel portal and retrieval shaft. Final completion has been achieved, and financial close out will occur in the coming months.

SFMTA expects that the net cost change to the tunnel contract will be minor, as the cost increases for extra work and cost decreases for deleted work and contractor payments for construction-related damage are expected to be approximately equal. *A damage claim by a property owner adjacent to the tunnel alignment has been settled and will not impact the cost of the project.*

Contract 1300 (Combination of UMS, CTS, YBM, and STS). This contract is constructing three underground stations, one surface station, all surface works required for the installation of LRT between 4th and King streets and the tunnel portal, and all LRT track and systems components.

As of the end of February 2016, the construction of the Stations and Surface, Track, and Systems contract was 41.1% complete on the basis of cost and 45.2% complete on the basis of completed construction. SFMTA believes that the reported cost to date is understated due to issues with the cost-loading of the contractor's schedule for completed tasks.

Union Square/Market Street Station (UMS): *The new schedule performance goal for UMS is to install the concourse level (the first level below ground) struts and walers in the station box by September 1, 2016.* The triangle formed by Market Street, the westbound lane of Ellis Street, and the western end of the Ellis Street Annex remained uncovered pending design and installation of a solution for the continuing water leakage at the seismic joint between the new UMS structure and the old Bay Area Rapid Transit (BART) station entrance structure. This issue is not impacting the overall progress of work at UMS. At the south concourse, preparations for installation of a vertical drainage pipe were underway. *At the northern end of the station box, excavation of the soil from inside the box was delayed by the discovery of hydrocarbons in the soil. An unidentified tank was pierced during placement of the piles that form the temporary*

support of excavation walls of the box. Soil testing confirmed that the soil was contaminated but not hazardous. Special disposal of the soil was arranged and further testing was conducted to determine the extent of the contamination. Since the contaminated soil is contained by the north concourse structure, there is no risk of ground water contamination from the hydrocarbons. Placement of the first phase of the concrete station box roof at O'Farrell Street was complete. Phase two was projected to be underway from March 28 to April 22. On April 23, traffic will be switched to the opposite side of O'Farrell Street for phase three of the O'Farrell roof. Jet grout placement was completed in the O'Farrell intersection and was expected to be complete south of O'Farrell on April 20. Jet grouting will commence north of O'Farrell in late April and continue into May. The leveling course of shotcrete in the north concourse was completed in late March. Excavation to the first level of struts and walers in the north concourse was projected to be complete April 13. On the surface, all but one utility connection below the street level was completed. After a final connection is made, the street will be backfilled, curb and gutter constructed and the roadway pavement placed. The roadway above the north concourse is expected to be completed at the end of April. Demolition of the 2nd and 3rd floors of the UMS garage was underway, along with placement of the plaza level deck over the station entrance. ***In the opinion of the PMOC, the delays to construction due to unforeseen utilities, underground storage tanks, and other conditions at UMS should largely be over. Once the roof deck is complete at the O'Farrell intersection, excavation should be able to proceed without interruption.***

Chinatown Station (CTS): *The established schedule performance goal for CTS is to complete the cross-cut cavern by June 15, 2016 (revised from July 24, 2016). The SFMTA Resident Engineer (RE) for CTS left the project and a new RE was scheduled to start work on April 11. Installation of struts and walers at level 4 of the headhouse was completed on April 5. Installation of the barrel vault tubes was completed and the tubes were being filled with grout through April 16. The contractor is working two shifts per day and six days per week on this activity. Excavation of the cavern is projected to start April 18. Excavation and installation of temporary support for the north access shaft was expected to be complete on April 15.* ***In the opinion of the PMOC, progress toward achievement of the new schedule performance goal for CTS is critical to the overall progress of the CSP. Progress toward achievement of the goal should be monitored closely.***

Yerba Buena/Moscone Station (YBM): *The new schedule performance milestone for this work package is to place the invert slab of the station box by September 15, 2016. The SFMTA RE for the work package stated that work is on track to meet this goal.*

Traffic has been shifted away from the east curb of 4th Street to allow installation of new utilities that will feed the expansion of the Moscone Convention Center, beginning with a 12" water pipe, followed by a 36" sewer force main, and then completed with a 24" water pipe. Placement of struts at the concourse level of the headhouse was projected to be completed on April 14. Leaks have appeared in the vent shaft connecting to the headhouse, and leak repair was underway in early April. In the station box, the initial leveling course of shotcrete was placed at the

mezzanine level in late February. *Test panels for the final course of shotcrete to form the station walls were completed and are under evaluation. Waterproofing and reinforcing steel will be placed in preparation for the final course of shotcrete in April, pending approval of the test panels.* Support beams for the interface of the tunnel and station box were placed in late February and early March. The tunnel segments within the station box limits were removed in March. *Meanwhile, preparations are underway for the placement of the concourse level slab in the station box, with the first concrete pour for the slab having occurred on March 31. The third and final deck pour is now scheduled for May 10.*

Surface, Track, and Systems (STS): *The schedule performance goal for this work package is to place the tunnel invert slab by April 25. The achievement of this goal may be impacted by the lead time for delivery of drainage grates and frames. The contractor is trying to obtain the initial shipment of the grates earlier than the April 30 date promised by the supplier.* Muni Traction Power duct bank (MRY), alternative water supply system (AWSS), street lighting, traffic signal, and sewer work continued. Overhead Contact System (OCS) pole foundations were being installed for trolley bus lines in the areas affected by construction. *The critical completion of the cutover of AT&T and other telecom services to the newly constructed communication ducts was on track to be completed by April 15. Once the cutover is done, demolition of the old duct bank can begin. The PMOC was informed that a repair for the minor problems with the geometry of the curves connecting the T Line to the Embarcadero has been defined but has not been completed. Problems with the grounding of one of the track circuits at 4th and King are temporarily resolved, but investigation into the adequacy of the material used to isolate the track system from the surrounding ground is underway. One of the switch machines at the 4th and King intersection was reported to be going out of adjustment. The contractor will assist in obtaining maintenance requirements and standards from the manufacturer. The contractor continued preparations for work in the tunnel, with the initial pour schedule depending on the delivery of catch basin frames and grates.*

Despite the focused attention of the CSP's senior management team, there has been no evidence of recovery of the construction schedule from accumulated delays, *although the latest set of schedule performance goals could result in some schedule recovery if achieved.*

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

Bay Area Rapid Transit (BART)

The close out of Contract 1252 depends on the removal of monitoring equipment from BART facilities. *Work plans have been submitted to BART and comments returned. Target for completion of the removals is the end of April 2016.*

Caltrans

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

CPUC

The California Public Utilities Commission (CPUC) is participating in the various safety meetings, including the Safety and Security Certification Review Committee (SSCRC) and Fire and Life Safety Committee (FLSC) meetings. Representatives of the CPUC also regularly attend the SFMTA/Federal Transit Administration (FTA) Quarterly Progress Review Meetings (QPRMs). SFMTA reported that all certifiable items related to the tunnel construction had been certified by the FLSC and accepted by SFMTA's Safety department. The FLSC has now begun to address the certifiable items list for the Stations Contract. Rail crossing permits from CPUC are required for the at-grade portion of the project alignment. SFMTA is working with CPUC to resolve design issues for the signalization and warning signage for the crossings.

San Francisco Public Utilities Commission (SFPUC)

No updates to report.

San Francisco Department of Public Works (SFDPW)

No updates to report.

San Francisco Parks and Recreation Department

No updates to report.

Private Property Owners

All real estate acquisitions have been completed. There will be a need to extend the duration of some of the licenses for compensation grouting. SFMTA continues to work with property and business owners to address construction-related issues as they arise. The claim from Piazza Pellegrini for damage associated with work by the 1252 contractor *has been settled and the contractor's insurance will cover the costs*.

The project installed settlement monitoring equipment at sensitive buildings adjacent to the project. There were 370 total licenses for monitoring equipment and property agreements. The monitoring equipment related to the tunnel construction has been removed or transferred to the station contractor, along with the associated monitoring data.

Vehicle Status of Design, Procurement, Testing, and Integration

Vehicle design and fabrication is underway by Siemens Corporation for 4 LRVs for the Central Subway, 20 LRVs for near-term fleet expansion, and 151 LRVs for fleet replacement. Options for up to 85 additional vehicles are available for fleet expansion. The vehicle design and assembly process is reported to be on schedule, with the first cars due to be delivered to SFMTA in 2016, well ahead of the CSP opening date. Four of the five final design reviews have been completed, and testing of some of the vehicle components and systems is underway. *Production of the first carbody structure is now underway, and the frame for the first half of the initial car is nearing completion.* SFMTA reports that it is working on integration of the vehicle with the

system-wide radio replacement project as well as the farebox replacement program. *FTA has requested a presentation on these related projects at the next QPRM.*

Real Estate

All project right-of-way has been acquired, and all commercial and residential relocations are complete. The final value judgment related to the acquisition of a license for monitoring and compensation grouting at 19 Stockton Street was rendered and the associated payment was made. This should be the final payment for real estate by the project.

Labor Relations and Policies

Appendix G of the Project Monthly Report details the Small Business Enterprise (SBE) goals and actual participation on each contract. SFMTA contract goals range from 6 percent to 30 percent 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

No updates to report.

B. PROJECT MANAGEMENT PLAN AND SUB-PLAN IMPLEMENTATION

Project Management Plan (PMP)

The latest update of the PMP was received by the PMOC in early April 2016. The PMOC will conduct a review of the revised PMP in April 2016.

Environmental Assessment/Mitigation Plan/Archaeological Plans

The PMOC received the Fourth Quarter 2015 Mitigation Monitoring Reporting Program (MMRP) update from SFMTA on March 29, 2016. The PMOC will review this report during April 2016.

Real Estate Acquisition Management Plan (RAMP)

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

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

See section F.

Safety and Security Management Plan (SSMP)

See section G.

Risk and Contingency Management Plan (RCMP)

See section H.

C. PROJECT MANAGEMENT CAPABILITY AND CAPACITY

An update of the PMP was received as scheduled in April 2016.

Agency Staff

Total project staff levels are close to the planned values. SFMTA reported that *four additional staff members have been added to the project team, with two in scheduling and two assigned to clearing the backlog of contractor change order requests. The Deputy Program Director – Project Services is still on leave.* ***In the opinion of the PMOC, the addition of project staff should improve the CSP Team's ability to track and forecast schedule performance and to resolve the outstanding and future issues associated with contract changes.***

Contractor Staff

SFMTA reported that TPC has added a second scheduler to its project staff.

D. PROJECT COST STATUS

Project Cost Control Systems

SFMTA continued to maintain the Trend Log and logs of Change Order Requests (CORs) and Proposed Contract Changes (PCCs) for Contract 1300 using Contract Management 13 (CM13). The Trend Log includes all potential changes in contract value, including items that, in the opinion of the CSP staff, are not merited and new items for which merit has not been determined. The companion contract change management log includes items that have been determined to have merit and are progressing through negotiations toward a contract modification (CMod). SFMTA is working to improve the timeliness of processing determinations of merit as well as the progression of pending contract changes and completion of CMods by creating summary tables of the numbers of items that are in the various stages of processing.

Reports showing the status of contract changes are reviewed weekly at the status meetings for each of the work packages in the 1300 Contract. **In the opinion of the PMOC, the trend and change management summary reports now being published by SFMTA improve the accuracy of forecasts of cost at completion and*, along with the added resources for assessment of merit and estimating costs,* should help to expedite the completion of the contract modification process for justified contract changes.** *A total of 18 contract modifications had been executed as of the end of February 2016, with no new CMods being executed in the past two months. As noted later in this report, several CMods were executed after the closing date for SFMTA's February Monthly Progress Report.*

Project Cost (As of February 29, 2016)

Cost estimate: $1.5783 billion.

Total contingency: $83.03 million (minimum contingency is $60 million), unchanged from January.

Total net incurred costs: *$907,951,763, an increase of $14.25 million from January (57.53% of the total project budget).*

Current funding level: $1,179,794,000 (74.8% of the total project budget).

Earned Value (EV): *$936,198,133, an increase of $11.23 million from January.*

Planned Value: *$1,174,792,723, an increase of $12.54 million from January.*

Cost Performance Index (CPI): *1.03.* SFMTA believes that TPC is under-reporting actual costs, thereby resulting in an overstated CPI.

CPI is a measure of cost efficiency on a project. It is the ratio of EV to actual cost value. A CPI equal to or greater than 1 indicates a cost under run and a value of less than 1 indicates a cost overrun. A value of 0.9 or greater is considered acceptable, considering the margin of error in estimating the value of completed work.

An outstanding claim by the 1251 contractor of $3.8 million is still pending resolution. SFMTA is of the opinion that the claim on the 1251 Contract has less merit than the previously settled claim on the 1250 Contract. Potential costs for the 1251 Contract claim are not being carried in the project Trend Log.

Project Cost Trends

SFMTA tracks potential changes in project cost, calling these potential changes "trends." Trends include all potential changes in the contract value. As the status of an identified trend changes, it may become a contract modification, it may become an item that is paid on a force account basis, or it may be denied/closed with no impact to the project cost. Extra cost items identified by the 1300 contractor that CSP management concludes have no merit are carried in the total trend amount at 50% of the contractor's estimate of extra costs. Table 2 summarizes the trends for the two construction contracts that have not attained financial close out.

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

	1252 – Tunnel (no change from January)	1300 Stations, STS
Original Contract	233,584,015	839,676,400
Approved Contingency	2,484,953	20,000,000
Extra Budget for Non-Project Costs	6,173,508	
Approved Budget	236,068,968	859,676,400
Approved Changes	1,421,807	270,956
Current Contract (1252 does not include non-project costs)	235,005,822	839,947,356
Remaining Contingency	1,063,146	19,729,044
Potential Changes (Trends)	(34,969)	*23,832,796*
Potential Contract	234,970,853	*863,780,152*
Contingency Less Trends	1,098,115	*(4,103,752)*

	1252 – Tunnel (no change from January)	1300 Stations, STS
Spent to Date	234,616,308	*353,422,196*
Potential Left to Spend	354,545	*510,357,956*
Contingency Less Trends as % of Potential Cost to Complete	309.7%	*-0.8%*

[1] As reported in the *February 2016* Central Subway Project Monthly Progress Report – SFMTA.

The remaining contingency, less identified trends, represents 310% of the potential left to spend for Contract 1252. After potential changes are accounted for, there is no contingency remaining for Contract 1300. **In the opinion of the PMOC, the 1300 Contract contingency will need to be increased by transferring unallocated contingency to this contract**. The combined allocated contingency for all construction work less identified trends is now a negative number. **In the opinion of the PMOC, the allocated contingency for the 1252 Contract is greater than the amount required to assure final close out of the contract within the budget. The allocated contingency for the 1300 Contract appears insufficient to complete the contract, and the overall contingency allocated to construction is inadequate for the percentage completion level of construction. However, there appears to be sufficient unallocated contingency and excess allocated contingency from other program components for successful completion of the program.**

Table 3 shows the overall budget, trends, and contingency status for the entire Central Subway program. **As shown, the total contingency, including unallocated contingency and less identified trends, represents 9.7% of the potential remaining spending, which, in the opinion of the PMOC, is sufficient to provide reasonable assurance of on-budget completion of the project.**

Table 3 - Budget and Contingency Status for Central Subway Project[2]

	Total Construction	Right of Way	Vehicles	Professional Services	Unallocated Contingency	Total Program
Original Contract	1,130,842,776	36,511,799	24,108,712	310,518,041		1,501,981,328
Approved Contingency	30,301,196	1,000,000	2,276,941	18,221,079	10,019,456	61,818,672
Extra Budget for Non – Project Costs	6,173,508					
Approved Budget (w/o Extra Launch Shaft Cost)	1,161,143,972	37,511,799	26,385,653	328,739,120	24,519,456	1,578,300,000
Approved Changes	8,349,006	(4,265,478)	(10,799,712)	-		(6,716,184)
Current Contract	1,139,191,782	32,246,321	13,309,000	310,518,041	24,519,456	1,495,265,144
Remaining Contingency	21,952,190	5,265,478	13,076,653	18,221,079	24,519,456	83,034,856

	Total Construction	Right of Way	Vehicles	Professional Services	Unallocated Contingency	Total Program
Potential Changes (Trends)	*23,797,827*	-	-	-		*23,797,827*
Potential Contract	*1,162,989,609*	32,246,321	13,309,000	310,518,041		*1,519,062,971*
Contingency Less Trends	*(1,845,637)*	5,265,478	13,076,653	18,221,079	24,519,456	*59,237,029*
Spent to Date	*647,373,432*	30,646,005	2,147,204	*226,606,548*		*907,951,763*
Potential Left to Spend	*515,616,177*	1,600,316	11,161,796	*83,911,493*		*611,111,208*
Contingency Less Trends/Potential Left to Spend	*-0.4%*	329.0%	117.2%	*21.7%*		*9.7%*

[2] As reported in the *February 2016* Central Subway Project Monthly Progress Report – SFMTA.

Change Order Control

SFMTA continues to estimate that additional CMods with a net reduction in contract value of $34,969 will be executed as part of contract close out for the 1252 Contract. There remains a potential for additional minor cost increases or decreases.

SFMTA is maintaining its management tools for tracking potential contract changes for the 1300 Contract. *The latest summary report is titled "CN1300 Trend Statistics" and is dated April 6, 2016. This report shows that 23 contract modifications have been approved (several of these after February 29) for a net increase in the contract value of $3,008,000, an increase of $2,737,044 from March 2. Change Order Requests (generated by the contractor) that have been determined to have merit and Proposed Contract Changes (generated by SFMTA) have an expected value of $17,314,538 in increased contract value, a decrease of $1.86 million since early March. An additional 169 items are being tracked in the Trend Log with a net value of $13.24 million in possible contract value increases. Of these, 146 have been judged by SFMTA to be without merit, but are being carried at a reduced value in the trend to address potential future claims. A further 108 items have been voided and are carried at no cost. There are eight notices of potential claims by the contractor, and 15 items are "open" waiting for a determination of merit.*

The most recent version of the complete Trend Statistics Summary for the 1300 Contract dated April 4, 2016 shows a total potential increase in contract cost of $33,562,621, including the $3.0 million in contract cost increases executed thus far. The total estimated cost impact of the identified trends increased by about $1.0 million from March to April. The following trend items with potential cost increases in excess of $250,000 are identified in the Trend Log:

1. Changes to traffic signals and street lights - $298,307
2. Change to grade 50 steel from specified grade 70 steel (due to availability and Buy America issues) - *$572,884 (down from $595,197)*

3. Extra trucking costs for contaminated soil at CTS - *$2,274,225 (up from $1,714,052)*
4. Harder rock than anticipated for CTS slurry wall excavation - $2,820,600
5. Delays to installation of tangent piles at UMS - $1,082,380 (increased from $1,074,229)
6. Changes to underpinning requirements for support of UMS Garage - $474,470
7. Changes in construction sequence for UMS Garage - $500,000
8. Obstructions to jet grout placement at UMS - *$1,279,410 (increased from $1,197,010)*
9. Additional instrumentation for detection of ground movement - $429,777
10. 12" water line conflict at UMS - *$338,265 (increased from $293,538)*
11. Sewer line conflict at UMS - $744,465
12. Changes in installation requirements for art glass at UMS - $681,978
13. Time impacts due to power pole conflict during demolition at CTS - $2,412,252
14. New emergency stop switch for CSP operations - $315,001
15. Removal of temporary facilities from 1252 Contract in tunnel - $616,354
16. 12" water line conflict at YBM - *$292,036 (down from $355,711)*
17. Additional traffic control requirements at 4th and King - $675,001
18. Additional traffic control requirements for STS work package - $1,032,302
19. Changes to AWSS layout at 4th and King - $295,269
20. Cost of changes to the design to Chinatown Station to accommodate the plaza requested by the community - $4,500,000 (costs will be paid by funds outside the program)
21. Contractor-claimed change in contract requirements for pre-loading permanent struts at UMS - $250,001.
22. Contractor claimed change in contract requirements related to the design loads for permanent struts acting as temporary support - $2,700,001
23. Contractor-claimed delay costs due to re-sequencing of work at CTS - $250,001
24. Missing conduit between manholes at UMS - $250,001
25. *Contaminated soil at YBM in guidewall construction area - $257,594 (new)*
26. *Extension of 24" water main to Howard Street - $250,001 (new)*
27. *Additional quantities for CMod 19 at CTS - $300,001 (new)*
28. *Change in vent for emergency generator at UMS - $500,001 (new)*

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

1. Deletion of compensation grouting bid items at YBM - ($1,833,869)
2. Deletion of the Air Replenishment System (ARS) - ($4,689,000)
3. Building cost savings from deletion of ARS - ($600,000)

Funding and Expenditures

Federal, state, and local project funding and expenditures are shown in Table 4 and are unchanged from the previous reporting period.

Table 4 - Project Funding

Source	Committed ($1,000)	Awarded ($1,000)
Federal		
New Starts	942,200	619,196
Congestion Mitigation	41,025	41,025
Federal Subtotal	983,225	660,221
State		
TCRP	14,000	14,000
State RIP	88,000	12,498
Prop. 1B / PTMISEA	307,792	307,792
Prop. 1A / HSR	61,308	61,308
State Subtotal	471,100	395,598
Local		
Prop. K Sales Tax	123,975	123,975
Local Subtotal	123,975	123,975
Project Total:	**1,578,300**	**1,179,794**

E. PROJECT SCHEDULE STATUS

There was no master program schedule update for the CSP in either January or February 2016. SFMTA rejected the contractor's schedule submittals for the last two months. Furthermore, SFMTA did not complete its update of the project schedule to reflect recommendations from the November 2015 schedule workshop facilitated by the PMOC. **The PMOC is very concerned about the continuing unavailability of a reliable schedule tool and the resulting uncertainty regarding the current status and likely completion date for the project.**

The contractor's December 2015 schedule update indicated that the construction work was nearly 10 months behind schedule. The critical path for the construction work continues to flow through the construction of CTS. In December 2015, the projected RSD was forecast for May 2019, five months later than planned. There is negative float on the project critical path and time savings must be identified for the remaining work if the project is to be completed on time.

The PMOC facilitated a Schedule Workshop with SFMTA project management and project controls staff on November 18 and 19, 2015. The goal of the workshop was to identify strategies

to help recover the accumulated delays to the Stations, Systems, and Surface works contract and to achieve the RSD required in the FFGA for the project. Objectives were to:

- identify refinements to the schedule for the project that has been developed by the contractor, TPC, in the Primavera P6 scheduling tool;
- identify changes in schedule logic that would save time;
- identify ways to streamline the construction process to speed up delivery of the project;
- identify ways to re-sequence the construction work to save time; and
- explore ways to reduce the time between substantial completion of the construction work and the RSD.

An initial proposed action plan for developing the necessary tool from the current TPC schedule includes the following steps:

1. SFMTA makes adjustments to schedule logic in TPC schedule.
2. SFMTA evaluates the resulting schedule and finalizes the recommended logic changes.
3. SFMTA reviews the resulting schedule tool with TPC.
4. SFMTA and TPC agree on refinements.
5. Final schedule refinements made by TPC or SFMTA, and revised schedule accepted for ongoing use.
6. Routine schedule updates continue with the revised schedule. SFMTA continues to make its own updates based on three-week look-ahead schedules and actual progress as a check on TPC schedules. Monthly meetings held to resolve any differences.
7. SFMTA (and TPC) evaluate changes to work sequence, options for acceleration, and other strategies for schedule recovery. Mutually agreed recovery strategies implemented in revised schedule.

If TPC and SFMTA cannot agree on the schedule refinements (step 4), SFMTA develops its own schedule forecasting tool in parallel with TPC and continues to work with TPC to accept the revisions through monthly schedule reconciliation meetings.

As of the February 2016 SFMTA Progress Report for CSP, SFMTA had completed items 1 through 3, but the contractor had not yet responded to SFMTA's schedule improvements and had not submitted a schedule update incorporating those improvements. SFMTA delivered a letter to the contractor stating that he was out of compliance with contract requirements regarding the schedule. *SFMTA reported that it expected to meet with the contractor to discuss the schedule update for March 2016 on April 6. SFMTA expected the contractor to include the required modifications to the schedule to bring it into compliance with contract requirements. SFMTA reported that the contractor is more focused on the project schedule than at any time during the project. SFMTA has added two staff members to support the project scheduling function and is working to complete a full update of the as-built project schedule, including the timing of*

submittals and submittal responses. The PMOC plans to convene a second schedule workshop for the project to identify, evaluate, and prioritize schedule recovery strategies for implementation as soon as SFMTA completes the implementation of the recommended schedule tool improvements.

As a means of encouraging better collaboration among the project participants, SFMTA and TPC have been identifying interim progress milestones to track the completion of construction work. To date, the record of meeting the milestone target dates has been mixed. *New performance targets have been identified for work on the critical path for the project, which flows through the excavation for CTS, as well as the other three construction work packages. Table 5 shows the new milestones and the current status for each.* ***In the opinion of the PMOC, the latest performance milestones, if achieved, could reduce the accumulated delay to the construction work by one to one and one half months. Given the past record of achievement of identified construction progress targets, the effectiveness of the new milestones in advancing the construction work remains to be seen.***

Table 5 - Interim Milestones for CTS Construction Progress[4]

Milestone	Target Date	*Status*
Complete cross-cut cavern at CTS	*June 15, 2016*	*On track*
Install concourse level struts and walers	*September 1, 2016*	*On track*
Complete invert slab for station box at YBM	*September 15, 2016*	*On track*
Place tunnel invert slab	*April 25, 2016*	*Potential delay due to delayed delivery of material*

[4] *SFMTA Management Meeting, 4/4/2016*

Project Schedule Data

Earned Value (EV): *$936,198,133, an increase of $11.23 million from January.*

Planned Value: *$1,174,792,723, an increase of $12.54 million from January.*

Schedule Performance Index (SPI): 0.80. SPI greater than 1 is ahead of schedule and less than 1 is behind schedule. SFMTA has identified the minimum acceptable SPI to be 0.90; the current SPI indicates unacceptable schedule performance. The SPI remained unchanged from the December reporting period. SPI must increase if the project is to be completed on time.

SPI is a measure of schedule efficiency on a project. It is the ratio of earned value to planned value. An SPI equal to or greater than 1 indicates more work was completed than planned and a value of less than 1 indicates less work was completed than planned. A value of equal to or greater than 0.9 reflects satisfactory performance, considering the margin of error in estimating both earned value and planned value. The current value of 0.80 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), December 7, 2018 (F)
RSD:	December 26, 2018 (P), May 24, 2019 (F)

The current master schedule incorporating the approved 1300 Contract baseline schedule and updated actual progress through December 2015 reflects negative buffer float and late completion of the project.

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

In the opinion of the PMOC, there has been no evident recovery of accumulated schedule delays. *Progress toward achievement of the latest set of schedule performance targets should be closely monitored to assess whether actual schedule improvement is occurring.* SFMTA is further encouraged to continue to improve the collaboration between the agency construction staff and the contractor so as to advance the construction work.

Critical Path Summary *(Baseline Schedule)*

CTS Install Guidewalls, Slurry Walls, and Install Surface Deck (complete)
CTS Excavate Headhouse and Bracing (complete)
CTS Sequential Excavation Method and Install Supports *(underway)*
CTS Headhouse Structural Concrete/Remove Bracing
CTS Install Mechanical, Electrical, and Plumbing (M/E/P) Equipment
CTS Start Up and Testing
CTS P-1254R Commissioning of Station

Safety and Security Certification/Pre-Revenue Activities
RSD on December 26, 2018 (currently forecast *May 24, 2019*)

Three Month Look-ahead

The following activities are planned over the next three months:

1300 Contract

UMS

Complete waterproofing the interface between the Powell Station and the Ellis Street Annex and complete the backfill and paving of Ellis Street

Continue Union Square Garage (USG) selective demolition, shear wall installation for permanent structural support for north concourse entrance

Install shoring in the tunnel and prepare the tunnel for break-in

Demolish existing structures at the BART Powell Street entrance

Continue jet-grout operations

Continue compensation grout operations

Complete the remaining sections of the station box roof deck and start excavation to platform level

CTS

Fill barrel vault pipe with grout to complete top of cross-cut cavern

Excavate to the level 5 struts and walers

Initiate and complete excavation of the cross-cut cavern from the headhouse to the station

Place floor slab and walls of the north access shaft

YBM

Place shotcrete walls above the mezzanine level in the station box

Complete placement of concourse level slab

Excavate station box to the platform level

Complete structural support for tunnel/station interface and remove the tunnel liner segments within the station area

Place utilities in 4th Street above the station box

STS

Sewer installation and repair

AWSS installation

Muni ductbank installation

Installation of fiber optic cable by AT&T

Installation of the tunnel invert slab

Start installation of tunnel lighting

Install overhead contact system support poles

Placement of tunnel drainage and invert slab

The PMOC expects to attend the following meetings:

- Weekly Management (first Monday of each month)
- Weekly Contract 1300 Construction Progress Meetings (first Tuesday and first Wednesday of the month)
- Weekly Configuration Management Board (CMB) (first Wednesday of each month)
- Monthly CSP Risk Management Meetings (first Thursday of each month)
- CSP month-end meetings on May 3, 2016; June 7, 2016; *and July TBD, 2016*
- FTA/QPRM scheduled for May 4, 2016

F. QUALITY ASSURANCE AND QUALITY CONTROL

QA/QC Plan Implementation

Contractor QC, as detailed in the Contract Technical Specification, is the means by which the contractor ensures that construction complies with the requirements of the contract. The contractor conducts at least three phases of control (Preparatory Phase, Initial Phase, and Follow-up Phase) to ensure that all work is carried out per the contract.

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 adverse to quality are corrected. In the event that the contractor does not issue a CNCR, SFMTA may issue a Notice of Non-conformance (NCN) where non-conforming work is identified by SFMTA's quality assurance staff.

The contractor's commitment to quality and the execution of the contractor's Quality Management Plan have been concerns of SFMTA for the 1300 Contract. SFMTA completed an audit of the TPC Quality Control system, including staff and procedures, in May 2015. That

audit was completed in early June 2015, identifying six corrective actions to be taken by the contractor. The findings of the audit have yet to be closed.

Construction crew attention to quality remains an issue. The following quality issues and concerns for the 1300 Stations Contract were identified in the SFMTA *February* monthly report:

- Assurance that all Requests for Information (RFIs), submittals, and USE-AS-IS and REPAIR dispositioned CNCRs related to a particular concrete placement, have been approved by the SFMTA REs. Practically, SFMTA REs have imposed a concrete placement hold point for all concrete placements to collectively ensure that the contractor has performed all work to the requirements of the Contract Documents, i.e., all RFIs, CNCRs, and submittals have been approved and acceptably executed.
- SFMTA's provision of advance notification to TPC/TPC QC, of in-process work that appears to be deficient or of questionable nature, is not mitigated/reconciled in a timely manner, if at all.
- Necessity of using both Reinforcing Steel Design Drawings and approved Reinforcing Steel Shop Drawings to inspect/accept rebar placement. The requirement to use approved shop drawings was identified as a preventative measure for improper/incomplete placement of reinforcing steel. It is common practice to assure that the latest approved submittals and shop drawings are available in the field, for use by both the construction crews and the QC inspectors, to assure proper installation of all constructed elements.
- Approved submittals for UMS structural steel are awkward, at best, for TPC Production, TPC QC, and RE's QA Inspectors to ensure that all work is performed as required by American Welding Society (AWS) D1.1 and the contract documents. TPC QC Engineers review TPC QC Certified Welding Inspector's (CWI) (Smith Emery provides the TPC QC Inspections) welding inspection documentation to verify that all welds are accounted for and accepted prior to concrete placement. TPC has not been providing complete submittal packages in a timely manner to support advancement of the construction.
- Welding inspection and associated documentation of CWI acceptance of all welded joints, including tack welding at UMS.
- The number of Field Notifications issued by SFMTA to TPC for work at UMS that TPC appears non-responsive to.
- Special trackwork manufacturing and circuit grounding issues.

As of April 1, 2016, 177 CNCRs had been filed by TPC's Quality Manager (seven more than in March). Seven new items were under review, seven other items had responses identified but not yet approved, the proposed response to one item was disapproved, and 11 items has approved responses that were not yet implemented. 125 items were closed and 26 items had been voided. The PMOC conducted a Quality Review of the CSP in September, and a draft report was delivered to FTA for review in late September. That report was finalized in early November 2015. The report identified recommended refinements to the organization charts and descriptions

of certain staff positions' quality-related responsibilities to clarify the quality assurance organization. The report also recommended that executive management support for the quality program be demonstrated through approval signatures on quality plans by TPC and SFMTA executive management. The PMOC's Quality Review of the project concluded that the SFMTA staff is implementing the SFMTA QA Program as described in the SFMTA Quality Management Plan (QMP). The fundamental implementation of the SFMTA quality program and SFMTA management's support of the program were readily apparent during the PMOC's QA program review. SFMTA's Quality Manager stated that the upcoming update of the PMP will include changes to the reporting structure and position descriptions reflecting the PMOC's comments from the Quality Review. *The updated information in the PMP will be reviewed in April.*

G. SAFETY AND SECURITY

Safety and Security Management Plan (SSMP)

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 have not been completed and 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. As of January 2016, all items related to the tunnel construction had been certified and accepted by SFMTA's safety staff. The certification work will begin to address the station construction items in 2016. The San Francisco Fire Department (SFFD) regularly attends the now combined FLSC and SSCRC meetings. The SFFD will continue to coordinate with the Stations Construction Project to identify issues of importance during construction.

Construction Safety

The 1300 Contract is maintaining an excellent safety record, with a total of three recordable and three lost time incidents since the project start. 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 – Start of Contract through January 2016

	No. of Incidents	Incident Rate	Goal
1300 Contract			
OSHA Recordable Accidents	3	*0.62*	<3.4
Job Transfer/Restricted Duty Incidents	*0*	*0*	NA
Lost Time Incidents	0	0	<1.6
Total Incidents	3	*0.62*	NA
Hours Worked	*965,624*		

H. PROJECT RISK, RISK MANAGEMENT, AND RISK MITIGATION

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

The PMOC cannot recommend any reduction in the minimum schedule contingency because the SFMTA's risk assessment update was not based on the actual current status of the 1300 Contract construction work. The Contract 1300 baseline schedule was adopted in early December 2014. Twelve schedule updates have been completed by the contractor and accepted by SFMTA and incorporated into the Master Program Schedule. The schedule risk assessment update is now expected from the CSP after the schedule tool in P6 is further enhanced and a recovery schedule is produced. The risk assessment would be conducted to assess the probability that the recovery schedule will result in the project meeting the required RSD. The timing of the risk assessment will be determined in the coming months.

The PMOC attended the April 2016 Risk Mitigation Meeting for the CSP, which included a review of the status of the top construction risks. The following significant updates were provided during the meeting:

- *Risk 232 (Risk that the program construction falls behind schedule and that schedule delays cannot be recovered.) – SFMTA's Program Executive noted that TPC management is more focused on the construction schedule than ever before. Schedule performance goals have been established for construction progress for each work package. On the critical path, the goal for completion of the cross-cut cavern at CTS is June 15, 2016. If that target is achieved, the construction completion date could be improved by one to one and a half months. The RSD is currently forecast to be five months late, so the time saving represents about 20 – 30% of the current accumulated delay.*

- *Risk 233 (Risk that the contractor's proposal to use shotcrete instead of cast in place concrete for finished walls results in poor quality finishes.) – SFMTA noted that the test panels completed for the shotcrete walls were of acceptable quality. This risk appears to be low if the contractor uses the methods followed for the test panels.*
- *Risk 240 (Risk that unresolved responsibility for schedule delays results in increased program costs.) – SFMTA reviewed the status of ongoing work to finalize the schedule tool and the as-built records of the actual construction progress. SFMTA and TPC are working to reconcile past issues.*
- *Risk 205 (Risk that extended time to process CMods results in "bad blood" between the contractor and REs.) – SFMTA is monitoring the status of CMods during weekly meetings between TPC and SFMTA. Both parties are resource challenged to produce the materials needed for execution of the CMods (contractor cost proposals, agency cost analysis, documentation of merit, confirmation of merit, scope description and limitations). SFMTA has added two new staff to assist with merit analysis and cost estimate preparation. In the opinion of the PMOC, the new staff should help clear the backlog of contractor change order requests, including resolution of long-standing schedule-related CORs.*

A list of the top risks discussed at the April 2016 Risk Mitigation Meeting is included in Appendix D.

In the opinion of the PMOC, the Risk Mitigation meeting continues to be an effective forum for identifying potential risks and developing mitigation measures to limit the impact of the risks. The PMOC will continue to monitor the Risk Mitigation meetings to assess the SFMTA's risk mitigation activities.

I. ACTION ITEMS

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

Table 8
The PMOC's Central Subway Points of Action for SFMTA
(Note: All closed items are removed a month after being closed. Changes to open items since last update are indicated in BLUE.)

Category	NO.	ACTION	DATE OPENED	DUE DATE	DATE CLOSED	COMMENTS
S	**164**	Develop technically acceptable schedule tool in P6	12/10/15	*4/20/2016*		SFMTA working with contractor to make schedule improvements
S	**165**	Develop recovery schedule	12/10/15	TBD		SFMTA to work with contractor on recovery strategies
S, RA	**166**	Update schedule risks based on recovery schedule	12/10/15	TBD		Once the schedule tool and recovery schedule are complete

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

APPENDIX A. LIST OF ACRONYMS

APTA	American Public Transportation Association
ARS	Air Replenishment System
AWS	American Welding Society
AWSS	Alternative Water Supply System
BART	Bay Area Rapid Transit
BCE	Baseline Cost Estimate
BRT	Bus Rapid Transit
Caltrans	California Department of Transportation
CAR	Corrective Action Request
CFR	Code of Federal Regulations
CLIN	Contract Line Item Number
CM13	Contract Management 13
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
CWI	Certified Welding Inspector
DF	Designated Function
EV	Earned Value
FD	Final Design
FEIR	Final Environmental Impact Report
FEIS	Final Environmental Impact Statement
FFGA	Full Funding Grant Agreement
FLSC	Fire and Life Safety Committee
FMP	Fleet Management Plan
FRA	Federal Railroad Administration
FTA	Federal Transit Administration
IRP	Independent Review Panel
LONP	Letter of No Prejudice
LRT	Light Rail Transit
LRV	Light Rail Vehicle
M/E/P	Mechanical, Electrical, and Plumbing
MMRP	Mitigation Monitoring Reporting Program
MOU	Memorandum of Understanding

MPS	Master Project Schedule
MRY	Muni Traction Power System
Muni	Common Public Reference to SFMTA
NCN	Notice of Non-conformance
NCR	Non-conformance Report
NEPA	National Environmental Policy Act
NTP	Notice to Proceed
OCS	Overhead Contact System
OHA	Operational Hazard Analysis
O&M	Operations & Maintenance
OP	Oversight Procedure
PCC	Proposed Contract Changes
PE	Preliminary Engineering
PHA	Preliminary Hazard Analysis
PMOC	Project Management Oversight Contractor
PMP	Project Management Plan
PTMISEA	Public Transportation Modernization, Improvement, and Service Enhancement Account
QA/QC	Quality Assurance/Quality Control
QMP	Quality Management Plan
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
SIT	Systems Integration Test

SoMa	South of Market (Street)
SOP	Standard Operating Procedure
SPI	Schedule Performance Index
SSCP	Safety and Security Certification Plan
SSCRC	Safety and Security Certification Review Committee
SSCVR	Safety and Security Certification Verification Report
SSMP	Safety and Security Management Plan
SSO	State Safety Oversight
SSP	System Security Plan
SSPP	System Safety Program Plan
STS	Surface, Track, and Systems
TBD	To Be Determined
TBM	Tunnel Boring Machine
TPC	Tutor Perini Corporation
TSA	Transportation Security Administration
TVA	Threat and Vulnerability Analysis
U.S.C.	United States Code
UMS	Union Square/Market Street Station
USG	Union Square Garage
YBM	Yerba Buena/Moscone Center Station
YOE	Year of Expenditure

APPENDIX B. SAFETY AND SECURITY CHECKLIST

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

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

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

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

Central Subway Project Overview			
Project mode (Rail, Bus, BRT, Multimode)	Light Rail Transit		
Project phase (Preliminary Engineering, Design, Construction, or Start-up)	Construction		
Project Delivery Method (Design/Build, Design/Build/ Operate/Maintain, CM/GC, etc.)	Design-Bid-Build		
Project Plans	*Version*	*Review by FTA/FRA*	**Status**
Has the grantee verified conformance with safety and security requirements during testing, inspection, and start-up phases?	N		Project is in construction, with RSD more than three 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		
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*		Currently being developed. An Integration Matrix has been implemented for all disciplines including safety and security concerns. Initial draft of the Rail Activation Plan has been completed.
Has the grantee issued final safety and security certification?	N		Project is in the construction phase.
Has the grantee issued the final safety and security verification report?	N		Project is in the construction phase.
Construction Safety			
Does the grantee have a documented/implemented Contractor Safety Program with which it expects contractors to comply?	Y		Health and Safety Construction Safety Standards Revision 3, June 27, 2012.

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

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

N/A = Not applicable.

APPENDIX C. PROJECT MAP AND OVERVIEW

CENTRAL SUBWAY PROJECT: Project Overview and Map

Date:	*April 12, 2015*
Project Name:	Central Subway Project (CSP) New Starts Light Rail Transit
Grantee:	San Francisco Municipal Transportation Agency (SFMTA)
FTA Regional contact:	Mr. Jeffrey S. Davis
FTA Headquarters contact:	Ms. Kim Nguyen

Scope

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

Schedule

07/02	Approval Entry to PE	2016	Estimated Rev Ops at Entry to PE
01/10	Approval Entry to FD	2018	Estimated Rev Ops at Entry to FD
10/11/12	FFGA	2018	Estimated Rev Ops at FFGA
05/24/2019			Revenue Operations Date at date of this report

59.32% *Percent Complete Based on Progress* (*February 2016 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
$907.95 million	Amount of Expenditures at date of this report from Total Project Budget of $1,578 million
57.53%	Percent Complete based on Expenditures at date of this report
$24.52 million	Unallocated Contingency remaining
$83.03 million	Total Project Contingency (allocated and unallocated contingency as reported by CSP)
$60 million	Minimum Total Project Contingency revised on September 5, 2012 PMOC review of Contingency Management Plan

	AT HOLD POINTS	QTR	Minimum Contingency Levels	Revised Levels
1A	Hold Point 1a – Tunnels 100% designed February 2011 (Actual)	1Q11	280	280
1B	Hold Point 1b – CTS 100% designed June 2012 (Actual)	4Q11	250	240
1C	Hold Point 1c – 40% Bid (Tunnel and CTS)	2Q12	225	200
1D	Hold Point 1d – FFGA Award October 2012 (Actual)	3Q12	-	180
2	Hold Point 2 – Commence CTS / UMS construction (Actual June 17, 2013)	2Q13	160	160
3	Hold Point 3 – Demobilize Tunnels *(Actual April 15, 2015)*	*2Q15*	140	140
4	Hold Point 4 – Stations to platform levels (CTS/YBM) November 2016	4Q16	60	60
5	Hold Point 5 – Complete CTS / Tunnels systems inst. April 2018	2Q18	25	25
RSD	PMOC / FTA RSD	4Q18		
CURRENT TOTAL CONTINGENCY $83.03 Million				


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

APPENDIX D. TOP PROJECT RISKS

The Project Risk Register was updated in early 2015. The following risks were discussed at the April risk mitigation meeting.

Top Risks Discussed in the Previous Month:

#232 – This is the top rated risk and is related to TPC being behind schedule and potentially unable to recover. *This risk continues, and new schedule performance targets have been set for each of the work packages.*

#233 – Related to the quality of the shotcrete lining substitution proposed by TPC being inferior. *This risk continues, but SFMTA is very close to approving the test panels prepared by the contractor, which demonstrated acceptable finished quality for the shotcrete surfaces. If the contractor matches the quality of the test panels in its work for the finished station structures, this risk will have been mitigated.*

#234 – This risk that the contractor's proposed alternative Sequential Excavation Method (SEM) excavation method would cause subsidence, was discussed and it was concluded that, as defined, the risk would largely disappear at this point, since the contractor will follow the sequence required in the contract. *However, the contractor is expected to continue to seek relief from contract requirements regarding the excavation in order to save time. SFMTA has obtained the services of a preeminent expert in SEM excavation to support its evaluation of contractor requests for modifications to the contract requirements.*

#237 – Risk that non-conforming work is not identified by the contractor's quality control system. This risk continues. *The quality program continues to be implemented in order to minimize the probability of occurrence and the consequences of this risk.*

#238 – This risk is that the Quality Program may be ineffective in processing the nonconformance issues causing schedule impacts. *The process of tracking and processing the Non-conformance Reports (NCRs) through improved tracking logs is continuing.*

#240 – This risk that unresolved assignment of schedule delay responsibility may lead to increased cost continues. *SFMTA and the contractor are working on schedule updates and on resolution of the causes for schedule delays that have occurred. Efforts continue to focus on how to reduce the accumulated delays.*

#104 – Risk that required PUC approval of grade crossings is not obtained. *CPUC is extending the time period for resolution of the permit issues.*

#99 – Risk that a breakdown in the relationship between SFMTA and the contractor results in increased claims and schedule delays. Executive management meetings between SFMTA and the contractor are held on a weekly basis. Executive management attends the weekly work package progress meetings to help identify and resolve key issues.

#204 – Risk that AT&T cutover work will be completed late and delay at-grade work in 4th Street. *TPC will start removal of the duct bank on April 18. All communication lines should be relocated at that time.*

#115 – Risk that station end walls leak and that responsibility between the station and tunnel contractors cannot be resolved. YBM end walls are not leaking. There are minor wet spots on the UMS end walls and TPC is supposed to repair these small leaks.

#205 – The risk that the prolonged process for approval and execution of CMods results in bad blood between SFMTA and the contractor. CMods are now being processed more quickly and the backlog of unresolved changes is being reduced.

#214 – Micropiles at UMS (placed by 1251 Contract) interfere with placement of compensation grout. All work north of Geary Street is complete without conflict. The risk will remain until all compensation grout tubes are in place.

#245 – Relocation of the SFMTA Project Management Operation results in reduced management effectiveness. This risk is minor. Plans for staff relocation are progressing and adequate office spaces will be available.

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 3 years in the future.
Prepare Schedule for Testing	TBD	TBD	TBD	Project is in construction, with RSD 3 years in the future.
Finalize Test Procedures	TBD	TBD	TBD	Project is in construction, with RSD 3 years in the future.
Conduct System Integrated Testing with trains, including procedures and reports	TBD	TBD	TBD	Project is in construction, with RSD 3 years in the future.
Complete Testing Reports	TBD	TBD	TBD	Project is in construction, with RSD 3 years in the future.
Operating Plan, Rules, and Training				
Finalize Operating Plan	TBD	TBD	TBD	Project is in construction, with RSD 3 years in the future.
Finalize / revise SOPs, manuals, and rulebook as applicable	TBD	TBD	TBD	Project is in construction, with RSD 3 years in the future.
Operations Manuals	TBD	TBD	TBD	Project is in construction, with RSD 3 years in the future.
Staffing and Operations Plan	TBD	TBD	TBD	Project is in construction, with RSD 3 years in the future.
Training of O&M personnel	TBD	TBD	TBD	Project is in construction, with RSD 3 years in the future.
Emergency response plan, training, and drills	TBD	TBD	TBD	Project is in construction, with RSD 3 years in the future.
Vehicle Maintenance Plan, Equipment, Facilities, and Training				
Rail Fleet Management Plan	TBD	TBD	TBD	
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.*

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 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 3 years in the future.
Spare Parts Requirements	TBD	TBD	TBD	Project is in construction, with RSD 3 years in the future.
Maintenance Manuals	TBD	TBD	TBD	Project is in construction, with RSD 3 years in the future.
Maintenance Training	TBD	TBD	TBD	Project is in construction, with RSD 3 years in the future.
Pre-Revenue Operations				
Finalize and/or update Rail Activation Plan (RAP) and/or Pre-Revenue Operations Plan	4/2/2015	TBD	TBD	Initial draft, including task identification complete. Schedule for updating and completing task descriptions TBD.
Implement Rail Activation Committee	TBD	TBD	TBD	Project is in construction, with RSD 3 years in the future.
Shadow operations	TBD	TBD	TBD	Project is in construction, with RSD 3 years in the future.
Develop / revise SSPP & Security Plan (approved by SSO)	TBD	TBD	TBD	Project is in construction, with RSD 3 years in the future.
FTA Office of Safety & Security Readiness Review	TBD	TBD	TBD	Project is in construction, with RSD 3 years in the future.
PMOC OP-54 Readiness for Revenue Operations Review Report, Phase I	TBD	TBD	TBD	Project is in construction, with RSD 3 years in the future.
Conduct Operational Hazard Analysis (OHA) and resolve other hazards / vulnerabilities	TBD	TBD	TBD	Project is in construction, with RSD 3 years in the future.
Pre-Revenue Operations	TBD	TBD	TBD	Project is in construction, with RSD 3 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**
Public Outreach				
Develop Safety Outreach Plan	TBD	TBD	TBD	Project is in construction, with RSD 3 years in the future.
Provide Community Outreach	TBD	TBD	TBD	Project is in construction, with RSD 3 years in the future.
Grand Opening Plan	TBD	TBD	TBD	Project is in construction, with RSD 3 years in the future.
Construction Close Out				
Close Out of Non-Conformance Reports	Ongoing	3/7/2019	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	3/7/2019	TBD	Punch list completion expected at final completion of 1300 Contract.
Certificates of Occupancy / Substantial Completion	TBD	3/7/2019	TBD	
Safety, Security, and Fire-life Safety Certifications				
Update/Finalize SSMP			2/18/2014	Revision 2 completed.
Finalize and/or update SCIL and SSCP			10/10/2008	Revision 0.
Implement Safety and Security Certification Committee			8/1/2010	Committee meets monthly to review certifiable items.
Implement Fire Life Safety Committee			8/1/2010	
Preliminary Hazard Analysis (PHA)				Need dates.
Threat and Vulnerability Analysis (TVA)				Need dates.
Design Criteria Reflecting Safety and Security Requirements				Need dates.
Review status of quality non-conformances	Ongoing	3/7/2019	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	1/7/2019		60 days before RSD - Check against latest regulations.

Roadmap to Revenue Operations - Central Subway Project, San Francisco Municipal Transportation Agency – DRAFT				
Description	**Estimated Start Date**	**Estimated Completion Date**	**Actual Completion Date**	**Notes**
Document Workarounds / Open Items List	TBD	TBD	TBD	
Verify emergency drills, tabletops, training, etc. are completed	TBD	TBD	TBD	
State Safety Oversight (SSO) final certification / signature	TBD	2/14/2019		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 3 years in the future.
Third Party/Agency Approvals Necessary for Revenue Service	TBD	TBD	TBD	Project is in construction, with RSD 3 years in the future.
Revenue Service				
Target Revenue Service Date	-	5/24/2019		Current forecast RSD. Recovery schedule to be prepared.
FFGA Revenue Service Date	-	12/31/2018		

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 five percent of project cost at Entry into FD and three percent at execution of an FFGA.

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

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

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

LL#	Date	Phase	Category	Subject	Lesson Learned
19	5-11-15	Const.	Quality Control	Use of latest design information for field inspection	After two roof pours were completed, it was discovered that required reinforcing steel was missing. Changes to the arrangement of the reinforcing steels were made as part of the submittal review and response process. Notes from the designer were included on the approved shop drawings but not in the contract design drawings. Field inspectors were using only the design drawings to confirm the proper installation of reinforcing steel prior to concrete placement. In the future, the latest design information, including submittals and related designer notes, will be used to inspect reinforcing steel prior to concrete placement.
20	9-28-15	Const.	Schedule	Maintenance of updated construction schedule and master program schedule	SFMTA was unable to obtain an acceptable baseline schedule from the station construction contractor for over a year. Then, SFMTA could not obtain acceptable updated status schedules from the contractor for another 8 months. As a result, the construction status and completion date could not be accurately determined for the first 20 months of the contract. This made schedule control impossible. SFMTA finally created its own schedule updates for the first 12 months of the construction contract using the pay applications and 3-week look-ahead schedules from the contractor. Lesson learned – owners should aggressively assert the need for accurate schedule updates from contractors and should withhold payment if such updates are included in the contract terms or specifications and are not forthcoming. If schedule updates are not received within the first few months of the project, the owner should create its own updates for the purpose of progress monitoring and schedule control.

LL#	Date	Phase	Category	Subject	Lesson Learned
21	11-30-15	Const.	Construction Planning	Installation of special trackwork in operating systems.	SFMTA needed to install special trackwork to provide the connection to the new alignment for Central Subway portion the T Third LRT line. The original plan was to install the special trackwork at the intersection in eight extended weekend shutdowns. Working with the contractor, the plan was revised to accomplish the necessary trackwork installations in two shutdowns. After considering the outcome of the first shutdown, where a portion of the special trackwork did not fit properly and needed adjustment during the shutdown, SFMTA decided to pre-assemble the second, more complex, special trackwork assembly at an off-site facility. The assembly was completed and the resulting track was surveyed to confirm the geometry and to assure that the assembly would fit into the existing field conditions. While conducting the assembly and disassembly of the track components, the contractor identified an approach that would reduce the time required to reassemble the trackwork in the field. As a result of the pre-planning and assembly of the complex trackwork, the final assembly was completed without the need for field adjustments and in less time than planned. This was an effective approach to mitigate the risks associated with the installation of complex custom track components in an operating transit line.

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 2015.

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:	Final total cost claim by contractor has not been resolved.	

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 not been resolved.	

Contract No.	**1252**	
Contract Description:	**Tunnels**	
Status:	*Final completion achieved. Financial close out underway.*	
Cost:	Original Contract Value	$233.58 million
	Approved Change Orders	$7.71 million
	Current Contract Value	$241.29 million
	Expended to Date	$234.62 million; $6.2 million is paid from non-project funds
	% Expended	97.2%
	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	$179,139
	Current Contract Value	$678,134
	Expended to Date	$638,278
	% Expended	94.1%
	SBE Participation	100%
Schedule:		
Issues or Concerns:	None.	

Contract No.	**1300**	
Contract Description:	**Three subway stations (YBM, UMS, and CTS) and STS**	
Status:	*Support of excavation work is complete. Placement of roof slabs is underway. Preparations underway for mass excavation.*	
Cost:	Original Contract Value	$839.68 million
	Approved Change Orders	$144,947
	Current Contract Value	$839.82 million
	Expended to Date	$331.61 million
	% Expended	39.5%
	SBE Participation	17.2%
Schedule:	NTP issued June 17, 2013. Substantial Completion planned February 10, 2018 and forecast December 2018.	
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 ongoing 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	$7,741,568
	% Expended	97.5%
	SBE Participation	29.7%
Schedule:		
Issues or Concerns:		

Contract No.	**CS-155-2**	
Contract Description:	**Design Package 2 for UMS, CTS, and YBM. CSDG prime**	
Status:	Designs are complete for all of the station contracts. Construction support of Contract 1300 is underway.	
Cost:	Original Contract Value	$35,059,252
	Approved Change Orders	$1,460,360
	Current Contract Value	$36,519,612
	Expended to Date	$30,845,986
	% Expended	84.5%
	SBE Participation	42.2%
Schedule:		
Issues or Concerns:		

Contract No.	**CS-155-3**	
Contract Description:	**Design Package 3 for STS. HNTB-B&C Prime**	
Status:	Design is complete. Construction support of Contract 1300 is underway.	
Cost:	Original Contract Value	$16,822,238
	Approved Change Orders	$312,814
	Current Contract Value	$17,232,252
	Expended to Date	$24,341,480
	% Expended	141.3%
	SBE Participation	28.0%
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	$52,457,677
	% Expended	61.6%
	SBE Participation	35.4%
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	$8,796,914
	% Expended	51.4%
	SBE Participation	29.0%
Schedule:		
Issues or Concerns:		