MONTHLY REPORT
April 2015

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

Draft Report delivered to FTA on *May 15, 2015*
Final Report delivered to FTA on *May 20, 2015*

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

Work Order Number: 001
OPs Referenced: 01 and 25
CLIN 0002B

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Time on project: *11 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 Sacramento Street in downtown San Francisco. The CSP is Phase 2 of the San Francisco Municipal Transportation Agency's (SFMTA) Third Street Light Rail Transit 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 March 2015, the project was 48.9% complete based on expenditures.* There are two active construction contracts: 1252 Tunnel Construction and 1300 Stations and Systems/Trackwork. *The 1252 contract was 98.8% complete at the end of March 2015. SFMTA confirmed on May 4 that substantial completion was achieved for the tunnel contract as scheduled on April 15, 2015.*

The 1300 Contract was *28.9*% complete at the end of *March.* Substantial completion is scheduled for February 2018, but the SFMTA *March* Monthly Progress Report states that the *third* update of the construction schedule from the contractor continues to forecast completion six months behind schedule. The most recent schedule update has been rejected by SFMTA, so the project still does not have an accepted schedule that accurately indicates the status of the project. **The Revenue Service Date (RSD) is still scheduled for December 2018, although, in the opinion of the PMOC, if the construction of the stations is six months behind schedule, the available float in the schedule has been consumed.**

The PMOC notes that earned value and actual cost were well below the planned value for March, which ended a two month trend of earned value and actual cost equaling or exceeding planned value. The PMOC notes that the value of installed work was planned to increase substantially in March over February (approximately $35 million compared to $20 million) but instead decreased to $12.4 million.

Table 1 - Core Accountability Items

Project Status:		**Original at FFGA:**	**Current Estimate:**
Cost	Cost Estimate	$1,578,300,000	$1,578,300,000
Contingency	Unallocated Contingency	$74,722,000	$10,019,456
	Total Contingency (Allocated plus Unallocated)	$185,500,000	*$80,973,077*
Schedule	Revenue Service Date	12/26/2018	12/26/2018
Total Project Percent Complete	Based on Expenditures	*48.9%*	
	Based on Earned Value	*48.7%*	

Major Issues	**Status**	**Comments/Planned Action**
Schedule Contingency	Project schedule contingency is currently at 4.8 months. Based on progress of the stations contract, much of this contingency may have been consumed by delays.	The minimum schedule contingency agreed to at this stage of the project is 8.0 months. The CSP has submitted justification to decrease the minimum required, but this will not be accepted until the updated 1300 Contract schedule is incorporated into an updated schedule risk assessment and SFMTA provides a plan for recovering the accumulated delays on the project critical path.
Cost Contingency	The current Total Contingency is $81.0 million. The FTA recommends a minimum contingency level of *$60 million after completion of the tunnel contract. The tunnel is substantially complete, and current recommended cost contingency level is revised to $60 million.*	On April 26, 2011, SFMTA obtained a commitment from the Metropolitan Transportation Commission (MTC) for $150 million of (State) Regional Improvement Program funds to the project to be accessed in the event project costs increase above $1.5783 billion.

Technical Capacity and Capability	Three of the senior management staff members on the project have new roles and one senior manager has left the project.	The PMOC will monitor the effectiveness of the assigned management staff in their new roles, especially the preparation of accurate and consistent reporting data.
Date of Next Quarterly Meeting:		August 5, 2015

- *Earned Value (EV): $770,146,487– an increase of $12.42 million from February and 48.7 % of the budgeted project cost.*
- *Planned Value: $837,667,203 – an increase of $34.76 million from February.*
- *Actual Cost: $772,374,775 – an increase of $9.92 million from February.*
- Cost Performance Index (CPI): *0.99,* where greater than 1 means that value of the work completed is more than the cost of the work (under budget) and less than 1 means that the value of the work is less than the cost of the work (over budget).
- Schedule Performance Index (SPI): *0.92* where SPI greater than 1 is ahead of schedule and less than 1 is behind schedule.

Contingency

Cost Contingency

The total available contingency is $80.97 million, which is above the minimum required contingency of $60 million. It still appears that the tunnel contract likely will not consume its entire allocated contingency, potentially freeing some contingency for other aspects of the project. ***In the opinion of the PMOC, the available cost contingency is sufficient to provide reasonable assurance of on-budget completion of the project.***

Schedule Contingency

The Program Master Schedule for the Central Subway continues to show 4.8 months of buffer float for the RSD. An approved, updated 1300 Contract schedule still is not available to be incorporated into the master schedule. SFMTA reports that the contractor's unapproved schedule update supports an estimate of six months of delay to the 1300 Contract. Based on the contractor's schedule update and comments in the *March* SFMTA progress report, the program master schedule may now have negative buffer float for the planned RSD of late December 2018. The agreed level of schedule contingency at this phase of the project is 8.0 months. **In the opinion of the PMOC, SFMTA should work to quickly adopt the updated 1300 Contract schedule and incorporate it into the Program Master Schedule. Strategies to recover the accumulated delays should be aggressively pursued by both SFMTA and the contractor.** ***The PMOC is concerned that there is little evidence of positive action on the part of the***

contractor to recover the accumulating delays to the project. The earned value for March indicates that the project fell further behind schedule, rather than accelerating progress to recover earlier delays.

PMOC Observations, Opinions, and Concerns

- *In the opinion of the PMOC, the on-time and under budget substantial completion of the tunnel contract represents a major accomplishment for the project.*
- In the opinion of the PMOC, the tunnel contractor should prepare an analysis of the cause of the failure at Cross Passage 5.
- PMOC Concern: SFMTA reported that as of *March 31, 2015 the third version* of the updated schedule for the 1300 Contract shows a six month delay in the completion date. Such a delay would leave only four months between the completion of the stations work and the Revenue Service Date. SFMTA reports that the updated schedule still has not been accepted. In the opinion of the PMOC, SFMTA should urgently work to develop an acceptable updated schedule based on the accepted contractor baseline schedule and incorporate it into the Program Master Schedule.
- *In the opinion of the PMOC, the earned value performance of the project in March suggests that the project is falling further behind schedule.*
- In the opinion of the PMOC, SFMTA should urgently confirm whether any float is available in the schedule and prepare a plan for recovering the accumulated delays. In the opinion of the PMOC, the CSP management team has not yet given the problem of accumulated delays to the station contract the necessary attention to identify possible measures to recover the delay or mitigate the impact of the delay on the scheduled Revenue Service Date. *The PMOC will arrange for schedule recovery workshops to be conducted in the coming weeks, including the appropriate SFMTA CSP project management staff members.* Once schedule recovery strategies are identified, the implementation of the strategies and the effectiveness of the strategies in recovering the delays should be carefully monitored over the coming months.
- In the opinion of the PMOC, the total contingency, including unallocated contingency and less identified trends of *9.8%* of the potential remaining spending, is sufficient to provide reasonable assurance of on-budget completion of the project. *The available contingency is above the recommended minimum of $60 million.*
- The PMOC notes that the trend log for the 1300 Contract does not allow tracking of contract changes that will be paid outside of the CSP program separate from changes that will be covered by the program budget. Although the trend log includes notes as to the funding sources for each change, the PMOC suggests that the ability to do separate tracking of program costs would be useful to both SFMTA and FTA.

- *In the opinion of the PMOC, SFMTA responded appropriately to two recent quality issues that occurred on roof slab concrete placements for the Chinatown Station (CTS) and the Yerba Buena/Moscone (YBM) station. Relatively easy repairs were identified for both issues. At CTS, delays in concrete delivery resulted in the formation of a cold joint in a large roof beam. The contractor's project manager failed to implement a stop work order from the contractor's quality manager, which is a contravention of the Quality Management Plan (QMP). SFMTA determined the root cause of the problem was insufficient planning for major concrete pours. SFMTA will require comprehensive planning of all future concrete pours and plans to limit the size of pours. SFMTA also put the contractor on notice that continued failure by the contractor's project manager to adhere to the QMP requirements would not be tolerated. At YBM, all of the specified reinforcing steel was not installed prior to a pour, although the contractor's Quality Control inspection and SFMTA's Quality Assurance inspection documents indicated that the installation met contract requirements. SFMTA determined that the root cause of the issue was that the arrangement of the reinforcing steel was changed during the shop drawing review process and the change was not reflected in the contract drawings. Furthermore, the subcontractor failed to give notice that the steel could not be installed as shown on the shop drawings. Additional contractor rebar detailer/inspection staff will now be present for major concrete pours and both the design drawings and shop drawings and other submittal documents will be used to verify that the installation is correct. Despite the appropriate response to these issues, the PMOC remains concerned that the recent quality problems may indicate a lack of sufficient quality commitment by the contractor and a potential for future problems and associated delays and increased costs (borne by the contractor) for the repair or replacement of defective work.*
- The PMOC is concerned that the station contractor has been unable to present a sufficient work plan for the 4th and King Streets intersection. *At present, the work to tie-in the new line to the existing T-line at 4th and King is planned to begin over the July 4 weekend.* SFMTA should mobilize a team to plan this work in the very near future, as it is evident that the contractor is not adequately planning all of the necessary elements of the work on its own. Since the contractor has stated that the work cannot be accomplished according to the requirements of the contract, the first task of the team should be to confirm whether the contract requirements for the work can be implemented.
- *In the opinion of the PMOC, SFMTA could benefit from the support of the open position for a senior change order and claims control specialist to establish complete and accurate project records that can be used in the event that the contractor follows through on claims against SFMTA.*

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A. PROJECT STATUS

Full Funding Grant Agreement (FFGA)

The FFGA was signed on October 11, 2012.

Design

All designs are complete.

Construction

Contract 1250 (UR #1). This contract relocated utilities within the footprint of the proposed YBM, and work is complete.

Contract 1251 (UR #2). This contract relocated utility lines within the footprint of the proposed UMS and temporarily rerouted existing trolley coach lines around the construction zone, and work is complete.

Contract 1252 Tunnel.

- *At the end of March 2015, work on the tunnel contract was 98.8% complete. All work at the retrieval shaft was completed and the contractor had demobilized from the site. All restoration work in the North Beach area was also complete.*
- *Substantial completion was achieved on April 15, 2015. Punch list work is expected to be complete by May 15, 2015 supporting achievement of Final Completion of the contract on that date.*
- Cleaning and repairs of the tunnel liner segments continued.
- *Work to address the localized failure of the ground treatment at Cross Passage 5 was completed as of the substantial completion date for the contract. The cross passage was fully completed, and utility and street restoration work that was required as a result of the subsidence was also complete.* San Francisco Water Department (SFWD) requested some additional rehabilitation and repair work to water connections to an adjacent property that was not related to the ground subsidence. This additional utility work resulted in the street restoration *being completed later in April than originally planned.* **In the opinion of the PMOC, the contractor should prepare an analysis of the cause of the leak.**

In the opinion of the PMOC, the successful completion of the 1252 Tunnel Contract marks a significant achievement for the CSP. The tunnel was completed on schedule and well below its budgeted cost.

Contract 1300 (Combination of UMS, CTS, YBM, and STS).

- *As of the end of March 2015, the construction of the Stations and Surface, Track and Systems contract was 28.9% complete.*
- Union Square/Market Street Station (UMS): *Jet grouting to prevent water intrusion into the excavation in the areas supported by tangent piles is continuing on the east side of the station. There have been some problems with the jet grout program, including water intrusion into Macy's basement and some utility conflicts with the planned locations for jet grout placement. Jet grouting on the west side of the structure was delayed pending resolution of the procedures to be used. As of the end of March, 23 of the planned 398 jet grout columns had been placed in the north and south concourse areas. Two jet grout rigs are working to maximize production. At the north concourse, work to stabilize the existing Union Square parking garage continued with the installation of tie-backs to support the outer walls. The contractor has encountered issues with the support of the garage structure, and SFMTA is working with the designer and the contractor to resolve the issues. Underground tanks and unanticipated utilities were encountered in the north concourse excavation area, slowing the preparations for excavation and placement of the roof slab in this area. TPC removed the tanks in April after obtaining a permit for the work. The area above the north concourse between Geary and Maiden Lane was excavated to the roof level of the station, roof beams were installed, and the roof deck was scheduled to be poured at the end of April. At the south concourse, excavation to the compensation grouting level is complete, and grout tubes have been installed. Grout injection started on April 17. Excavation of the Ellis Street area was completed in March, and demolition of the BART station entrance was completed in April. Roof deck beams have been set, and reinforcing steel to support the shotcrete walls of the structure was installed.*
- Chinatown Station (CTS): The first section of the roof slab for the headhouse was poured on March 18. Problems with this pour resulted in a delay in the pour for the second section of roof from March 27 to late April. During the pour for the first section of roof, the TPC Quality Control (QC) manager called for a halt to concrete placement due to the potential for a cold joint as a result of delayed concrete delivery. The TPC project manager overruled the QC Manager's order and directed the work to proceed. This action was in violation of TPC's Quality Management Plan (QMP) for the contract. *SFMTA is now requiring that every large concrete pour be preceded by a pour plan, including contingency plans to be implemented in the case of interruptions in the delivery of concrete.* In addition to the cold joint issue, both pours have issues with form-savers (devices that allow the placement of dowels to structurally connect the two pours while avoiding damage to the concrete forms). *The Quality Assurance and Quality Control section of this report contains a detailed description of SFMTA's response to the quality issues with concrete pours at CTS and YBM. The third and final pour for the headhouse*

roof is now scheduled for early May 2015. In the station area, installation of dewatering wells and instrumentation to detect ground movement started in April. Utility conflicts were identified at the location of the north access shaft, and SFMTA is identifying how to resolve these conflicts. *SFMTA is working with the contractor to plan and implement the installation of the large number of deep dewatering wells that will be required to support the excavation of the station cavern.*

- Yerba Buena/Moscone Station (YBM): Construction of the roof of the western portion of the station box continued. The first portion of the structural roof was poured in early March, and utilities were placed above the deck in preparation for backfilling the area, which is scheduled for early April. The second section of the roof deck was excavated, formed, and poured in late March, and waterproofing was installed. After placement of the concrete on March 20, it was discovered that substantial amounts of reinforcing steel were not in place, despite the fact that the Quality Control (QC) and Quality Assurance (QA) forms for the pour were completed and signed off indicating that all work was in conformance with the contract. *A repair to provide the structural support that would have been provided by the missing steel has been implanted with relatively little impact to the construction schedule. SFMTA conducted an evaluation of how the Quality Program failed to prevent the installation of non-conforming work. The results are reported in the Quality Assurance and Quality Control section of this report. The southernmost section of the western roof deck was placed in early April. Work to install utilities above this final section of the western roof deck will extend into early May, followed by construction of the street above in preparation to shift traffic and begin construction of the eastern section of the roof. At the headhouse, the roof slab that will support Clementina Street was completed and utilities were installed above the deck. While excavating for the remainder of the headhouse, the contractor encountered building foundations and multiple underground storage tanks. This discovery delayed the completion of excavation of the headhouse to the first strut level until early May.*

- Surface, Track, and Systems (STS): Muni Traction Power duct bank (MRY), AWSS, and sewer work continued. *AT&T utility work was completed in April.* The contractor submitted a plan for starting the construction of the 4th and King improvements in May 2015. The submittal was incomplete, and the proposed work was disapproved. *The contractor is now proposing to begin the construction at 4th and King over the July 4 weekend. The contractor has stated that it can complete the necessary construction without the need to close the I-280 off ramp to King Street.* **In the opinion of the PMOC, TPC has yet to demonstrate that it has the necessary planning and coordination capabilities to effectively plan and execute the complex work to tie the CSP into the existing T-line while maintaining traffic and transit operations.**

The PMOC is concerned that the station contractor has been unable to present a sufficient work plan for the 4th and King Streets intersection. SFMTA has stated that it intends to

form a "swat team" to develop the necessary work plans to complete the complex work needed to tie the CSP into the existing T-line at 4th and King. SFMTA should mobilize the team in the very near future, as it is evident that the contractor is not completing the planning for all of the necessary elements of the work on its own. Since the contractor has stated that the work cannot be accomplished according to the requirements of the contract, the first task of the team should be to confirm whether the contract requirements for the work can be implemented.

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

Bay Area Rapid Transit (BART)

No updates to report.

Caltrans

SFMTA needs to extend the Caltrans encroachment permit for STS work. *Progress is being made toward execution of the permit, and no impacts to the construction schedule are anticipated.*

CPUC Communications

The California Public Utilities Commission (CPUC) was invited to, and 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/FTA Quarterly Progress Review Meetings (QPRMs). The next QPRM is scheduled for May 6, 2015.

San Francisco Public Utilities Commission (SFPUC)

No updates to report.

San Francisco Department of Public Works (SFDPW)

Sidewalk Legislation Permit for the STS work was expected to be approved in October 2014. SFMTA reported that modeling of the effects of a 100-year storm needs to be completed to support the approval for this permit.

San Francisco Parks and Recreation Department

The Memorandum of Understanding (MOU) for the Union Square Garage with the Parks and Recreation Department has been completed.

Private Property Owners

For 19 Stockton Street (Armani Exchange Building), condemnation was filed in February 2013. Pre-judgment possession was granted October 3, 2013, allowing the City access to install monitoring equipment and compensation grout tubes at the property. A settlement conference

was held in November 2014 in advance of the compensation trial, which was held as scheduled in December. The judgment regarding the value of the license for the property is pending.

For 790 Market Street/2 Stockton Street (Forever 21 Store), SFMTA has been communicating with the property owner regarding engineering issues and restrictions imposed by the easement for the property.

Notice of the pending termination of the lease agreement has been given to the property owner at the retrieval shaft. The lease is expected to be terminated in May 2015. SFMTA is also preparing for the termination of the lease from Caltrans of the land for tunnel contractor's offices and storage yard. The yard should be vacated by the tunnel contractor by the May 15 final completion date for the contract.

The Project has installed settlement monitoring equipment at sensitive buildings adjacent to the project. There are now 370 total licenses for monitoring equipment (ten were added to address the potential Pagoda retrieval shaft) and property agreements. The monitoring equipment is in the process of being removed or transferred to the station contractor, as the need for ongoing monitoring during station construction dictates.

Vehicle Status of Design, Procurement, Approvals by State Safety Board, Testing and Integration

On September 19, 2014, the mayor of San Francisco announced that SFMTA had awarded a contract to supply 175 LRVs to the Siemens Corporation for $648 million, or $3.7 million per vehicle. The initial order includes four LRVs for the Central Subway and 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. At the contracted price, the cost to the CSP of the four vehicles allocated to the project will be $14.81 million. This compares to a budgeted cost of $26,385,653 for Standard Cost Category (SCC) 70, including spare parts and contingency, and represents an $11.5 million savings. This savings partially offsets the trend of higher than estimated costs on the construction components of the project.

Real Estate

The CSP is in possession of all three subsurface easements required to construct the tunnels and both fee acquisitions required to construct the YBM and CTS stations. The CSP leased property at the former Pagoda Theater site for the retrieval shaft. That lease is expected to be terminated in May 2015 after the shaft is covered.

All project commercial and residential relocations are complete.

Labor Relations and Policies

Appendix E 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. See Appendix G.

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

The tunneling contractor has not achieved the level of participation in its contract by women and apprentices. SFMTA is requesting documentation from BIH of its good faith efforts in regard to hiring women and apprentices for its work.

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 May. This plan includes the initial draft of the rail activation plan.

Environmental Assessment/Mitigation Plan/Archaeological Plans

The PMOC received the First Quarter 2015 Mitigation Monitoring Reporting Program (MMRP) update from SFMTA on April 17, 2015. SFMTA has provided evidence of contractor submittals and Inspector Daily Reports to verify that the Mitigation Measures identified in the MMRP are being carried out during construction. **It is the PMOC's opinion that the grantee is sufficiently managing to ensure that the mitigation measures identified in the MMRP will be carried out during the course of the project.**

Real Estate Acquisition Management Plan (RAMP)

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

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

See section F.

Safety and Security Management Plan (SSMP)

See section G.

Risk and Contingency Management Plan (RCMP)

See section H.

C. PROJECT MANAGEMENT CAPABILITY AND CAPACITY

The PMOC received the latest update of the PMP in early May 2015. This plan included the updated organization chart provided to the PMOC in March.

Agency Staff

- An organization chart was provided to the PMOC by SFMTA on March 13, 2015, along with an announcement of changes in three senior management positions on the CSP project team. Albert Hoe will assume the role of Deputy Program Director Project Services, which supervises Contract Administration, Document Control, Project Controls (scheduling and cost), Financial Management, and Configuration Management and Risk Management. Eric Stassevitch will assume the role of Program Manager-Project Delivery in an acting status. This position supervises the Resident Engineering functions for all active construction. Rich Redmond, the former Program Manager-Project Construction, has left the project. Alex Clifford, the Construction Manager for the tunnel contract and the Third Party Coordination manager, will take on the role of CM Support, which appears to be a support role for the Program Manager-Project Delivery. The changes reflect significant changes in the functional roles of Messrs. Hoe and Stassevitch. The PMOC will be monitoring the effectiveness of the transition of the Project Controls functions, since Mr. Stassevitch was very actively involved in the oversight of the scheduling and cost control functions for the project. The PMOC noted that the Station Contract Progress Meeting held March 31 was more effective under Mr. Stassevitch's leadership than previous meetings attended by the PMOC.
- The latest project organization chart indicates an open position for Senior Construction Support (Change Order) Dispute Resolution Claims. *SFMTA stated that the stations contractor has yet to officially file any claims, although the contractor frequently raises concerns regarding schedule and cost impacts to its work.* ***In the opinion of the PMOC, SFMTA could benefit from the support of the open position to establish complete and accurate project records that can be used in the event that the contractor follows through on claims against SFMTA.***

Contractor Staff

- The March SFMTA Progress Report continues to state that the 1300 Contract contractor's management and administration of the subcontractors is a concern. The contractor is not evaluating the adequacy of the subcontractors' submittals and *the prime contractor's management staff does not regularly attend preparatory and initial phase meetings for planning upcoming work.* **In the opinion of the PMOC, lack of the prime contractor control and management of its subcontractors has been a long-standing significant concern for the project.** *SFMTA reported that additional experienced subcontractor staff are being assigned for the inspection of reinforcing steel in advance of concrete pours.*
- The SFMTA's March 2015 staffing analysis shows that there is *a deficit of approximately 4 FTEs in the Construction Management (CM) staff for the 1300 Contract (30 FTE planned and 25.7 FTE actual). The analysis also shows a deficit in design support for the*

1300 Contract (12.4 FTE planned, 10.75 FTE actual). The CM staff level for the tunnel contract is shown at 4.0 FTE. The PMOC assumes that most or all of the CM staff members for the tunnel contract will be shifted to the stations contract.

D. PROJECT COST STATUS

Project Cost Control Systems

SFMTA implemented a new Capital Program Control System in an effort to integrate existing systems with new software modules. The new system is comprised of Primavera P6, EcoSys Enterprise Planning and Controls (EPC), Contract Management 13 (CM13), and SharePoint. The system went live on December 13, 2012. CSP staff determined that the cost reporting information coming from the EcoSys EPC database was not working for this project and abandoned the use of this information in mid-2013. This increased the level of effort needed to provide accurate cost reporting and caused the staff to need to manually input data. FTA performed a review of the EcoSys module component of Capital Programs Control System. A draft report was provided to SFMTA for their technical review. Comments from SFMTA are pending. After receiving SFMTA's comment, FTA will issue a final report with recommendations.

In November 2014 the Office of the Controller, City Services Auditor published a report documenting the results of an independent review of the CSP cost accounting and management systems. The audit found that despite the various challenges faced by the CSP Office with respect to reporting project costs to the FTA, current reported costs are supported by reliable source data and past variances have been resolved. Specifically, the audit noted:

- Current schedule and cost predictions suggest that the project will not exceed its baseline budget and will open to the public as planned;
- Schedule and cost performance expectations compare to industry practices;
- Remaining significant project expenses related to construction are accounted for and contingency levels are closely monitored;
- Several levels of review and approval within various SFMTA entities must occur before a project expense is paid;
- City's Accounting System serves as the basis for reporting costs to the FTA;
- Excel-based cost reporting tool used to replace the Capital Program Control System is functional; and
- Explanations for past reporting errors have been accepted by the FTA.

The report included two recommendations:

- Continue working on fine tuning the cost workbook and associated written procedures.

- Work with SFMTA Accounting and the Controller's Office to formally "close" Financial Accounting Management Information System (FAMIS) index codes no longer used, such as those related to the already completed preliminary engineering phase, to minimize erroneous posting of current costs to past phases and activities.

SFMTA has been working to create a useful Trend Log for Contract 1300 using CM13. The trend log was finalized in July and is up and running. **The PMOC recognizes the significant accomplishment of creating the trend log for the 1300 Contract.** The PMOC notes that the trend log does not allow tracking of contract changes that will be paid outside of the CSP program separate from changes that will be covered by the program budget. Programming of the CM13 module would be needed to provide separate tracking of program and non-program costs. **Although the 1300 Contact trend log includes notes as to the funding sources for each change, the PMOC suggests that the ability to do separate tracking of program costs from non-program work would be useful to both SFMTA and FTA**.

Project Cost

Cost estimate:	$1.5783 billion
Total contingency:	*$80.97 million, no change from February 2014* (minimum contingency is $60 million)
Total net incurred costs:	*$772,374,775 (48.9% of the total project budget)*
Current funding level:	$1,029,794, 000 (65.3% of the total project budget)

Earned Value (EV): *$770,146,487 – an increase of $12.42 million from February, and 48.9% of the budgeted project cost*

Actual Cost: $*772,374,775 – an increase of $9.92 million from February*

CPI: 0.99

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 one indicates a cost under run and a value of less than one 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.

Two large claims have been made by the utility contractors for work on Contracts 1250 ($3.6 million) and 1251 ($3.8 million). SFMTA has stated that these total cost claims are not valid, since California law provides for total cost claims only if a contractor can demonstrate that it lost money on the contract. Audits of both contracts indicate that the contractors earned profits on both contracts, which suggests that the total cost claims will be invalidated**.** These potential costs 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. Table 2 summarizes the trends for the two active construction contracts.

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

	1252 - Tunnel	1300 Stations, STS
Original Contract	233,584,015	839,676,396
Approved Contingency	17,484,956	20,000,000
Extra Budget *for Non-Project Costs*	6,173,508	
Approved Budget	244,895,463	859,676,396
Approved Changes	*1,421,807*	*(1,432,743)*
Current Contract (1252 does not include non-project costs)	*235,005,822*	*838,243,653*
Remaining Contingency	*16,063,146*	*21,432,743*
Potential Changes (Trends)	*(104,753)*	*8,913,668*
Potential Contract	*234,901,069*	*847,157,321*
Contingency Less Trends	*16,167,899*	*12,519,075*
Spent to Date	*232,294,426*	*242,375,110*
Potential Left to Spend	*2,606,643*	*604,782,211*

[1] *As reported in the March 2015 Central Subway Project Monthly Progress Report – SFMTA.*

The remaining contingency, less identified trends, represents *620%* of the potential left to spend for Contract 1252 and *2.1%* of the potential left to spend for Contract 1300. The combined allocated contingency for all construction work less identified trends represents about *4.9%* of the potential remaining construction expenditure. **In the opinion of the PMOC, the allocated contingency for the 1252 Contract is greater than the amount required to assure completion of the contract within the budget. The allocated contingency for the 1300 Contract may not be sufficient to complete the contract, and the overall allocated contingency may be low for the percentage completion level of construction. However, there likely is sufficient unallocated contingency and excess allocated contingency from other program components, such as vehicles, 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 *9.8%* 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

	Total Construction	Right of Way	Vehicles	Professional Services	Unallocated Contingency	Total Program
Original Contract	1,130,342,777	36,511,799	24,108,712	310,518,041		1,501,481,329
Approved Contingency	45,301,196	1,000,000	2,276,941	18,221,079	10,019,456	76,818,672
Extra Budget for Non – Project Costs	6,173,508					
Approved Budget (w/o Extra Launch Shaft Cost)	1,175,643,973	37,511,799	26,385,653	328,739,120	10,019,456	1,578,300,000
Approved Changes	6,645,307	-	(10,799,712)	-		(4,154,405)
Current Contract	1,136,988,084	36,511,799	13,309,000	310,518,041		1,497,326,924
Remaining Contingency	38,655,889	1,000,000	13,076,653	18,221,079	10,019,456	80,973,077
Potential Changes (Trends)	*8,808,915*	-	-	-		*8,808,915*
Potential Contract	*1,145,796,999*	*36,511,799*	*13,309,000*	*310,518,041*		*1,506,135,839*
Contingency Less Trends	*29,846,974*	*1,000,000*	*13,076,653*	*18,221,079*	*10,019,456*	*72,164,162*
Spent to Date	*532,120,884*	*29,794,816*	*2,145,579*	*208,313,496*		*772,374,775*
Potential Left to Spend	*613,676,115*	*6,716,983*	*11,163,421*	*102,204,545*		*733,761,064*
Contingency Less Trends/Potential Left to Spend	*4.9%*	*14.9%*	*117.1%*	*17.8%*		*9.8%*

Change Order Control

The Contract 1252 Contract Modification/Trend Log – April 30, 2015 had the following activities:

- 49 Contract Modifications (CMods) totaling $1,533,909 of additional CSP program costs, all of which have been certified.
- Two Pending Contract Modifications (PCMs), which do not yet have estimated values.
- *No change orders were executed for this contract in April.*

CMods total $7.707 million, of which $5,150,000 is for the relocation of the retrieval shaft and $1.0 million is for utility work, which are not program costs.

The Contract 1300 Tend Log included in the March SFMTA Monthly Progress Report reflects the following:

- *30 trend items and Proposed Contract Changes (PCCs) that may lead to changes.*
- *46 Change Order Requests (CORs), most of which are being tracked on a time and materials basis.*
- *1 Pending Change Order.*

- *6 Approved CMods.*
- *A total potential change of +$8,913,668 is being reported in March 2015, an increase of $5,762,708 in total potential changes from February.*
- *No changes were executed for this contract in March.*

The trend log in the monthly report does not include all of the known trend items that, if decided in favor of the contractor, would result in significant cost increases. The most recent version of the complete Trend Log for the 1300 Contract *dated May 6, 2015 shows a total potential increase in contract cost of $16,789,873,* which is still below the allocated contingency assigned to this contract. The following trend items in excess of *$250,000* in possible higher costs 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) - *$595,197*
3. Extra trucking costs for contaminated soil at CTS - $3,743,672
4. Harder rock than anticipated for CTS slurry wall excavation - $5,971,414
5. Delays to installation of tangent piles at UMS - $4,279,663
6. Unstable rock caving into slurry wall excavation at CTS - $600,000
7. *Extra concrete from tunnel construction affecting slurry wall installation at YBM - two occurrences of $335,809*
8. *Changes to tie-back requirements for support of UMS Garage - $300,000*
9. *Changes in construction sequence for UMS Garage - $500,000*

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 - ($4,689,000)

Funding and Expenditures

Federal, state, and local project funding and expenditures are shown in Table 4.

Table 4 - Project Funding

Source	Committed ($1,000)	Awarded ($1,000)
Federal		
New Starts	942,200	*469,198*
Congestion Mitigation	41,025	*41,025*
Federal Subtotal	*983,225*	*510,223*

Source	Committed ($1,000)	Awarded ($1,000)
State		
TCRP	14,000	14,000
State RIP	88,000	12,498
Prop. 1B / PTMISEA	307,792	225,912
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**	**1,029,794**

E. PROJECT SCHEDULE STATUS

As of the end of March, the Project had received a third update to the Contract 1300 baseline schedule, but SFMTA stated that this update has been disapproved, along with the previous two updates. The March SFMTA Monthly Report states that the update to the schedule provided by the contractor continues to indicate that the completion of the contract would be six months late if delays are not recovered. **In the opinion of the PMOC, if this estimate of the accumulated delay is accurate, the available buffer float in the Program Master Schedule has been consumed by accumulated delays to the 1300 Contract. A revised schedule update is needed to confirm whether buffer float remains in the Master Program Schedule. In any event, it is apparent that some delays in the 1300 Contract have occurred and that a recovery schedule should be prepared.** SFMTA has indicated that it is focusing on the work to achieve the placement of the invert slabs in each of the stations to identify opportunities for reduced durations, parallel work, and elimination of unnecessary tasks in order to recover from the accumulated delays to the schedule. The planned revenue service date remains unchanged at December 26, 2018.

The 1252 Contract achieved Substantial Completion on the planned April 15, 2015 date. The substantial completion of the 1252 Contract is not on the critical path for the overall project.

Project Schedule Data

- *Earned Value (EV): $770,146,487 – an increase of $12.42 million from February and 48.9 % of the budgeted project cost.*
- *Planned Value: $837,667,203 – an increase of $34.76 million from February.*
- SPI: *0.92*

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 one indicates more work was completed than planned and

a value of less than one 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.

Earned value was approximately $12.4 million compared to the planned value of $35 million for the month of March. ***In the opinion of the PMOC, the shortfall in earned value compared to planned value indicates that efforts to recover the accumulating schedule delays are not yet showing positive results. Production will have to increase substantially in order to match the planned level of work completion and exceed the planned productivity in order to overcome the contractor's reported estimate of six months of accumulated delay to the critical path of the 1300 Contract that has now been reported in the last three SFMTA monthly progress reports.***

Based on the reported EV and planned value, the project has earned about $67 million less than planned. SFMTA stated that the methods of calculating earned value and planned value measures were revised in October 2014 to correct long-standing errors in the calculation. However, the planned value and earned value calculations are not yet based on an updated baseline schedule for the 1300 Contract. SFMTA has agreed to provide a detailed description of how the calculation of these performance indicators was changed and corrected. **In the opinion of the PMOC, the accuracy of the cost and schedule performance indicators can only be assured with the incorporation of the updated 1300 Contract baseline schedule into the performance measurement process.**

Table 5 shows the status of the schedule milestones established for the project.

Table 5 - Schedule Milestones

	(A = Actual Date, F= Forecast Date)
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; 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
RSD:	December 26, 2018

The current master schedule (incorporating the approved 1300 Contract baseline schedule, which has not been updated to reflect actual progress) reflects 4.8 months of buffer float. *Based on statements in the March 2015 CSP Progress Report, the 1300 Contract may be six months behind schedule for tasks on the critical path.* **In the opinion of the PMOC, much of the available schedule float appears to have been consumed by delays to the critical path activities in the 1300 Contract schedule.** SFMTA is working to identify actions that could recover the accumulated delays. ***In the opinion of the PMOC, The strategies to recover the accumulated delays have yet to result in accelerated production and the schedule performance of the project should be carefully monitored over the coming months.***

Schedule Contingency Management criteria were developed from the FTA Risk Assessment prior to entry into 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 at this time of the project is 8.0 months. As noted above, the current schedule reflects only 4.8 months of buffer float.

In October 2013, the CSP submitted the Draft Contingency Management – Schedule Update, which proposed changes to the schedule contingency minimum levels based on a recent risk assessment performed by the CSP team. The team used risk-based software, which employs the Monte Carlo method, to perform a probability analysis on the Project's Summary Schedule.

At this time, the PMOC cannot recommend that FTA accept any modification to schedule contingency minimum levels. The PMOC recommends that the CSP incorporate the updated Contract 1300 baseline schedule as soon as it is completed. At that time, the PMOC recommends that the CSP incorporate the remaining high level schedule risks on the Project Risk Register into a new risk assessment.

PMOC Concern: In accordance with FTA guidelines, a minimum of 8.0 months of schedule contingency is recommended at this phase of the project. We are awaiting the results of a schedule analysis based on the adopted and updated 1300 Contract baseline schedule to determine what schedule contingency remains.

Critical Path Summary

- CTS Install Guidewalls, Slurry Walls, and Install Surface Deck
- CTS Excavate Headhouse and Bracing
- CTS Sequential Excavation Method and Install Supports
- 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 Complete
- Safety and Security Certification / Pre-Revenue Activities
- RSD on December 26, 2018

Three Month Look-ahead

The following activities are planned over the next three months:

1252 Contract

- *Complete punch list items and achieve final completion on May 15, 2015*

1300 Contract

UMS

- *Progress I-beam, roof deck, and waterproofing installation for roof deck construction*
- *Install new roof on Ellis for BART Station entrance to UMS station*
- *Continue working on Union Square Garage tieback installation, micro-pile installation, and demolition*
- *Continue jet grouting operations on Stockton Street between Geary and O'Farrell streets*
- Install new roof on station between Maiden Lane and Geary Street

CTS

- Complete forming, reinforcement, and placement of concrete for the surface level deck
- Continue excavation under deck to the level where compensation grouting can occur
- Pre-grout soil prior to continuing with the headhouse excavation
- Install dewatering wells and monitoring equipment

YBM

- Complete excavation and placement of the roof slab on the west side of station box
- Place utilities above the west side roof and restore the street above
- *Switch traffic to the west side of 4th Street and begin excavation of the east half of the station roof*
- *Excavate to the first strut level in headhouse*
- Install struts at level one in headhouse

STS

- Sewer installation and repair
- Streetlight conduit installation
- Waterline installation
- Alternative Water Supply System (AWSS) installation
- Muni ductbank installation

The PMOC expects to attend the following meetings:

- Weekly Management (first Monday of each month)
- Weekly Contract 1300 Construction Progress (first Tuesday of each 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 June 2, July 7, and August 4*
- *FTA/QPRM scheduled for August 6, 2015*

F. QUALITY ASSURANCE AND QUALITY CONTROL

QA/QC Plan Implementation

Since the beginning of this project, Project QA has logged, tracked, addressed, and closed out each recommendation/finding made by the PMOC, identifying them as a Corrective Action item, and then using the overall project Corrective Action Log. The Project Quality Manager continues to conduct training for all new members of the project team as they are mobilized.

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.

For each of the construction contracts, the 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. *For the stations contract, the CQM is provided by a subcontractor.* The reporting structure is to provide the CQM with direct access to the contractor's Principal Officers. For each of the construction contracts, a Contractor Non-Conformance Report Log for identifying, correcting, documenting, and controlling non-conformances is maintained by the contractor. Subsequent work may not progress for work that is the subject of a Corrective Action Request until conditions adverse to quality are corrected.

Based on observations of the weekly progress meetings for each of the active construction contracts and the weekly CSP management meeting, the project team is actively engaged in quality assurance to monitor the contractors' compliance with the requirements of the Contractor QC process for each contract.

The following quality concerns for the 1252 Tunnel Contract were identified in the SFMTA *March* monthly report:

- Contractor's field repairs of tunnel liner segments per approved procedures
- Open Contractor Non-Conformance Reports (CNCRs) that await closing as a function of required liner repairs
- Completion of the index of final BIH JV Quality Documentation required for contract close-out

In the opinion of the PMOC, these routine procedural issues should be resolved prior to final completion of the tunnel contract on May 15, 2015.

The following quality issues for the 1300 Stations Contract were identified in the SFMTA *March* monthly report:

- *TPC Management not honoring TPC CQM Stop Work Notification (SWN) during a major roof slab pour at CTS (see text below). TPC QC has issued an internal Corrective Action Request (CAR #4) documenting what transpired and is currently awaiting response from the TPC Program Executive regarding what actions are to be taken to prevent recurrence of the failure to abide by the CQM's SWN. The Contractor Quality Control Specification Section requires that the CQM have the ability to issue SWNs.*
- *The use of Requests for Information (RFI) to obtain the Engineer's approval of suggested repairs associated with work that is the subject of a "Repair" dispositioned Contractor Non-conformance Report (CNCR) in lieu of using the CNCR process. RFIs are only for clarifications of the contract documents.*
- TPC's management and administration of their subcontractors. TPC's Project Engineers in particular are not apparently involved with the actual on-going work as well as not scrutinizing and evaluating the adequacy of subcontractor's submittals.
- TPC's Project Manager's, Project Engineer's, and Field Supervision's support of the implementation of TPC's Quality Control Program.
- *Inadequate internal TPC engineering support to the TPC Field Superintendents' determination of the adequacy of Sub Contractor submittals, which is overburdening the superintendents and leading to quality problems. This problem contributed to the problem of missing reinforcing steel in the 2nd and 3rd YBM roof placements (see text below). The Resident Engineer (RE) and QA staff are in the process of assisting TPC QC in developing effective corrective action(s).*
- Performance of UMS jet grouting.

Two significant quality shortfalls arose during the placement of concrete for the roof decks at CTS and YBM during the month of March that indicated a need for refinement of the Quality Management process for the station construction.

- At YBM, after placement of the concrete for the second section of the western roof deck on March 20, it was discovered that substantial amounts of reinforcing steel were not in place, despite the fact that the Quality Control (QC) and Quality Assurance (QA) forms for the pour were completed and signed off indicating that all work was in conformance with the contract. The required repair work delayed the subsequent pour for the third section of the roof deck. SFMTA conducted an evaluation of how the Quality Program failed to prevent the installation of non-conforming work. *The root cause determined for the missing steel was a change in the arrangement of the reinforcement that was documented on notes to the contractor's shop drawing submittals. The changes were not documented in a revised design drawing. The subcontractor misinterpreted the*

requirements for the placement of some of the steel and, as a result, found that the steel could not be installed as he envisioned the requirements. Rather than notifying the prime contractor, the subcontractor omitted the steel without raising the issue. The inspection staff was using the contract design drawings and from those drawings, the installation appeared to be correct. The corrective action to prevent the recurrence of this problem includes:

- *assignment of a full-time Quality Control Engineer (QCE) from the subcontractor to assure that the installation meets the requirements of the contract*
- *meetings between the subcontractor's foreman, the subcontractor's QCE, the TPC QCM and TPC QCE to review known field issues prior to reinforcing placement*
- *use of both the design drawings and contractor submittals with notes from the designer in checking the installation*
- *notification by the steel subcontractor in the event that steel cannot be placed as shown on the drawings and submittal documents*
- *TPC QC will conduct a pre-placement meeting for all future structural concrete placements, prior to TPC releasing their concrete placement hold point. The purpose of this meeting is to review and determine if all associated RFIs, last minute changes to submittals or shop drawings, and CNCRs have a status that documents acceptance of the configuration of the Work such that reinforcement can be accepted for the eventual placement of concrete*
- *TPC QM, TPC QC Engineer, and RE Quality Assurance inspectors will perform final joint inspection prior to acceptance of reinforcing steel*

- At CTS, the first section of the roof slab for the headhouse was poured on March 18, 2015. During the pour, the TPC Quality Control (QC) manager called for a halt to concrete placement due to the potential for a cold joint as a result of delayed concrete delivery. The TCP project manager overruled the QC Manager's order and directed the work to proceed. This action was in violation of TPC's Quality Management Plan (QMP) for the contract. SFMTA is considering how to respond to this breach of the QMP. *SFMTA conducted an evaluation of the quality issue and determined that the root cause of the cold joint was poor planning of the concrete pour by TPC and failure to follow the standards of the American Concrete Institute (ACI) regarding major concrete pours. A CAR was prepared regarding the TPC project manager's failure to abide by the QCM SWN. A response from TPC is still forthcoming, and SFMTA documented its serious concerns regarding the actions of the TPC project manager in a letter to TPC. SFMTA will require advance planning of all future structural concrete pours, confirm adherence by TPC to ACI standards, and will limit the size of future pours recognizing the restricted*

site access and possibility of traffic delays to delivery trucks at the station construction sites.

In the opinion of the PMOC, the 1300 Contractor's management and administration of subcontractor work and lack of management support for the project quality program is a long-standing concern that has now resulted in two instances of non-conforming work being installed, with attendant delays and potential added costs. The PMOC is concerned that the quality issues on two major roof slab concrete placements are evidence that the Quality Control (QC) and Quality Assurance (QA) processes for the project have not been fully effective in assuring that the installed work at the stations is in conformance with the contract. One of the events also showed that the station contractor is violating provisions of its adopted QMP. The PMOC is concerned that the quality issues revealed by recent events will result in further delays to the project and increased costs for the repair or replacement of defective work by the station contractor. ***In the opinion of the PMOC, SFMTA responded appropriately to these quality issues and has identified measures to prevent their recurrence. The PMOC urges SFMTA to continue to place top priority on the implementation of improvements to the Quality Program, including requiring the contractor to act in compliance with the adopted Quality Management Plan.***

Effective coordination and control of subcontractor work will continue to be critical to the timely completion of quality work on the stations. Many critical aspects of the contract will be constructed by subcontractors, including the 4th and King intersection improvements and the LRT track and systems. ***TPC's*** **assignment of additional staff for preparation of submittals and quality documentation for upcoming work is a positive step, but the contractor has yet to demonstrate sufficient control of its subcontractors or the ability to effectively plan upcoming work. Smoothing the process of preparing for planned construction activities will contribute to recovering from accumulated delays in the schedule. The PMOC will continue to closely monitor the effectiveness of the contractor's management processes in the coming months.**

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 outgoing PMOC did not review the SSMP at that time. The SSMP outlines the plans needed prior to revenue operations. These plans include the Rail Activation Plan, the System Integration Test Plan, the Safety and Security Certification Plan (SSCP), and the Pre-Revenue Operations and Start-up Plan. These last three plans have not been developed by SFMTA at this time, although SFMTA is working on the initial Rail Activation Plan.

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 California Public Utilities Commission (CPUC) staff began attending monthly as-built meetings to review the completed items. The San Francisco Fire Department (SFFD) regularly attends the now combined Fire and Life Safety Committee (FLSC) and Safety and Security Certification Review Committee (SSCRC) meetings. The SFFD will continue to coordinate with the Tunnel and Stations projects to identify issues of importance during construction. The Project has been working with the SFFD to try and eliminate the Air Replenishment System in both the tunnels and the stations.

Construction Safety

The project is maintaining an excellent safety record, with recordable and lost time incidents well below the OSHA goals for the type of construction. No incidents occurred on either of the active construction contracts in February. The current accident records are shown in Table 6.

Table 6 - Construction Safety Date - Project to Date

	No. of Incidents	Incident Rate	Goal
1252 Tunnel Contract			
OSHA Recordable Accidents	10	*2.41*	<3.4
Job Transfer/Restricted Duty Incidents	7	*1.69*	NA
Lost Time Incidents	1	*0.24*	<1.6
Total Incidents	18	*4.34*	NA
Hours Worked	*829,233*		
1300 Contract			
OSHA Recordable Accidents	0	0	<3.4
Job Transfer/Restricted Duty Incidents	0	0	NA
Lost Time Incidents	0	0	<1.6
Total Incidents	0	0	NA
Hours Worked	*489,267*		

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. On October 11, 2013, the CSP provided an updated report with new schedule modeling and a recommendation to reduce the current FTA minimum schedule contingency of 8.0 months. The PMOC provided a review of this document to FTA on November 21, 2013, and could not recommend at that time that FTA accept any modification to schedule contingency minimum levels based on the current documentation provided.

The PMOC recommends that the CSP incorporate the updated Contract 1300 baseline schedule as soon as it is approved. At that time, the PMOC recommends that the CSP incorporate the remaining high level schedule risks on the Project Risk Register into a new risk assessment. The Contract 1300 baseline schedule was adopted in early December. Schedule updates are underway and are yet to be approved by SFMTA and incorporated into the Master Program Schedule. The schedule risk assessment is now expected from the CSP in early 2015.

At the May CSP Risk Management Meeting the committee reviewed the status of the highest ranked risks in the risk register. The following highly ranked risks are able to be closed within the coming weeks:

- Utility conflicts in the Ellis Street area (UMS) – the excavation has reached the invert level so no further unanticipated utilities should be encountered. It was noted that asbestos material was encountered in the past few days, which will require mitigation
- *CTS construction delayed due to late finish of work by tunnel contractor (tunnel is substantially complete)*
- *Interference between micro-piles and Tube-a-manchette (pipes for placement of grout) at UMS (this risk may still be in effect since grouting is not completed)*
- *Delay in receipt of SFDPW excavation permits (all have been obtained)*

Several risks have reduced significantly although it is not yet possible to retire them:

- *Settlement at CTS causes damage to old utilities (many utilities have been replaced and the station has been lowered, reducing the likelihood of settlement at the surface)*
- *Differing site conditions at CP 5 for the tunnel contract (work is complete, there is still a potential for a claim from the contractor)*
- *Delays in construction due to Olivet Building redevelopment at YBM (slurry wall and roof slab construction adjacent to the building are complete)*
- *Delays to construction due to business or property owner complaints (impacts to businesses are being mitigated, businesses are largely not complaining)*

- *Delays due to Ship America requirements (other than the tunnel boring machines (TBMs,) all other materials are expected to be from domestic sources)*

Some newly identified risks (which are yet to be fully defined and described) were discussed. It was agreed that future risk management meetings should focus on rating these risks and developing mitigation plans and owners:

- *Accumulated schedule delays to the station contract (primarily delayed completion of support of excavation work) and potential recovery strategies*
- *Risks associated with testing and training activities after completion of construction*
- *Risks of costs or delays associated with resolving TPC's proposal to use shotcrete instead of cast in place concrete for the final finish of portions of the stations*
- *Risks associated with resolving the excavation methods and sequence for the mining of the CTS station cavern*
- *Risks of delays due to conflicts at the north concourse roof at UMS (mitigations largely defined and in process of being implemented)*
- *Risks of delays and higher costs due to quality issues. Mitigation measures for quality issues were identified and discussed. These measures are described in detail by the PMOC in the Quality Assurance/Quality Control section of this report.*

In the opinion of the PMOC, the CSP management team has not yet given the problem of accumulated delays to the station contract the necessary attention to identify possible measures to recover the delay or mitigate the impact of the delay on the ability of SFMTA to achieve the scheduled Revenue Service Date. *At FTA's request, schedule containment workshops will be scheduled with SFMTA in the near future.* A list of the top risks discussed at the latest Risk Mitigation Meeting is included in Appendix D.

In the opinion of the PMOC, the risk meetings are an effective forum for the evaluation of risks and the identification of mitigation measures. The PMOC will continue to monitor the Risk Mitigation meetings to assess the SFMTA's risk mitigation activities.

I. ACTION ITEMS

Table 7 on the following page shows the current action items for SFMTA.

Table 7
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, RA	**159**	Once the Contract 1300 Baseline Schedule has been approved, incorporate remaining high level schedule risks into a new risk assessment.	4/21/14	~~1/13/15~~ Revised to 5/8/15		PMOC recommendation from the Contingency Management – Schedule 2012 Update, Revision 1, October 2013
S, T	**160**	Initial draft of the Rail Activation Plan	12/2/14	3/31/15	5/4/2015	Original sent on April 1
PMP	**161**	Annual update of PMP	12/2/14	3/31/15	5/4/2015	Original sent on April 1
C, S	**162**	Documentation of changes in Earned Value and Planned Value estimation	1/14/15	~~1/28/15~~ Revised to 5/8/15		As promised in December 2014

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

ACI	American Concrete Institute
APTA	American Public Transportation Association
AWSS	Alternative Water Supply System
BART	Bay Area Rapid Transit
BCE	Baseline Cost Estimate
BIH	Barnard Impregilo Healy
BRT	Bus Rapid Transit
Caltrans	California Department of Transportation
CAR	Corrective Action Request
CFR	Code of Federal Regulations
CLIN	Contract Line Item Number
CM	Construction Management
CM13	Contract Management 13
CMB	Configuration Management Board
CMod	Contract Modification
CNCR	Contractor Non-Conformance Report
COR	Change Order Request
CP	Cross Passage
CPI	Cost Performance Index
CPUC	California Public Utilities Commission
CQM	Contractor's Quality Manager
CSP	Central Subway Project
CTS	Chinatown Station
DF	Designated Function
EPC	Enterprise Planning and Controls
EV	Earned Value
FAMIS	Financial Accounting Management Information System
FD	Final Design
FEIS	Final Environmental Impact Statement
FEIR	Final Environmental Impact Report
FFGA	Full Funding Grant Agreement
FLSC	Fire and Life Safety Committee
FMP	Fleet Management Plan
FTA	Federal Transit Administration
FTE	Full Time Equivalent
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
MTC	Metropolitan Transportation Commission
Muni	Common Public Reference to SFMTA
NEPA	National Environmental Policy Act
NTP	Notice to Proceed
OP	Oversight Procedure
PCC	Proposed Contract Change
PCM	Pending Contract Modification
PE	Preliminary Engineering
PMOC	Project Management Oversight Contractor
PMP	Project Management Plan
PTMISEA	Public Transportation Modernization, Improvement, and Service Enhancement Account
QA/QC	Quality Assurance/Quality Control
QCE	Quality Control Engineer
QCM	Quality Control Manager
QMP	Quality Management Plan
QPRM	Quarterly Progress Review Meeting
QTR	Quarter
RAMP	Real Estate Acquisition Management 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
SCC	Standard Cost Category
SCP	Safety Certification Plan
SEIS	Supplemental Environmental Impact Statement
SEPP	Security and Emergency Preparedness Plan
SFDPW	San Francisco Department of Public Works
SFFD	San Francisco Fire Department
SFMTA	San Francisco Municipal Transportation Agency
SFPUC	San Francisco Public Utilities Commission
SFWD	San Francisco Water Department
SoMa	South of Market (Street)

SPI	Schedule Performance Index
SSCP	Safety and Security Certification Plan
SSCRC	Safety and Security Certification Review Committee
SSMP	Safety and Security Management Plan
SSP	System Security Plan
SSPP	System Safety Program Plan
STS	Surface, Track, and Systems
SWN	Stop Work Notice
TBM	Tunnel Boring Machine
TPC	Tutor Perini Corporation
TSA	Transportation Security Administration
UMS	Union Square/Market Street Station
UR	Utility Relocation
U.S.C.	United States Code
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 will be submitted to the CPUC for approval.
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		Construction 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 contracts (1252 and 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		
Has the grantee ensured the development of security design criteria?	Y		
Has the grantee ensured conformance with safety and security requirements in design?	Y		Certification checklists are developed and certified.
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.
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 early stages of construction.
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	N/A		Currently being developed. An Integration Matrix has been implemented for all disciplines including safety and security concerns.
Has the grantee issued final safety and security certification?	N		Project is in the construction phase.
Has the grantee issued the final safety and security verification report?	N		Project is in the construction phase.
Construction Safety			
Does the grantee have a documented/ implemented Contractor Safety Program with which it expects contractors to comply?	Y		Health and Safety Construction Safety Standards Revision 3, June 27, 2012.

Central Subway Project Overview			
Project mode (Rail, Bus, BRT, Multimode)	Light Rail Transit		
Project phase (Preliminary Engineering, Design, Construction, or Start-up)	Construction		
Project Delivery Method (Design/Build, Design/Build/ Operate/Maintain, CM/GC, etc.)	Design-Bid-Build		
Project Plans	*Version*	*Review by FTA/FRA*	**Status**
Does the grantee's contractor(s) have a documented companywide safety and security program plan?	Y		
Does the grantee's contractor(s) have a site-specific safety and security program plan?	Y		There are currently two contractors that have plans. 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		
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:	*May 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 approximately four vehicles will be required.
Ridership:	43,521 Average Weekday Boardings are projected in 2030.

Schedule

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

48.7% *Percent Complete* Construction (*March 2015 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
$772.4 million	Amount of Expenditures at date of this report from Total Project Budget of $1,578 million
48.9%	Percent Complete based on Expenditures at date of this report
$10.02 million	Unallocated Contingency remaining
$80.97 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 (tunnel completion achieved, reducing recommended contingency by $80 million)

	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 *Expected April 2015*	*2Q15*	140	140
4	Hold Point 4 – Stations to platform levels (CTS/MOS) 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 *$80.97 Million*				


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

APPENDIX D. TOP PROJECT RISKS

The project risk register was updated in early 2015. The following risks were discussed at the May Risk Management Meeting.

Top Risks discussed in the previous month:

- *Ellis Street Utilities (unknown underground utilities)*
- *4th and King Street - Potential time for planned work shutdown - Contractor not able to perform the work in the manner prescribed*
- *Risks associated with testing and training activities after completion of construction*
- *Risks of costs or delays associated with resolving TPC's proposal to use shotcrete instead of cast in place concrete for the final finish of portions of the stations*
- *Risks associated with resolving the excavation methods and sequence for the mining of the CTS station cavern*
- *Risks of delays due to conflicts at the north concourse roof at UMS*
- *Risks of delays and higher costs due to quality issues*

APPENDIX E. ROADMAP TO REVENUE OPERATIONS

Awaiting rail activation plan from SFMTA.

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 (LONPs)	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 IRP, contractor, SFMTA, and BART representatives convened at predetermined 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 a 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.*

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.

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	87%
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	97%
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:	*Substantial completion achieved. Punch list work underway.*	
Cost:	Original Contract Value	$233.58 million
	Approved Change Orders	$7.71 million
	Current Contract Value	$241.29 million
	Expended to Date	*$238.75 million; $6.2 million is paid from non-project funds*
	% Expended	*98.9%*
	SBE Participation	5.8%
Schedule:	Final completion scheduled 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	-$1.42 million
	Current Contract Value	$838.24 million
	Expended to Date	*$242.37 million*
	% Expended	*28.9%*
	SBE Participation	*11.1%*
Schedule:	NTP issued June 17, 2013. Substantial Completion: Feb 10, 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	$1,697,245
	Current Contract Value	$7,492,245
	Expended to Date	*$7,450,454*
	% Expended	*99.4%*
	SBE Participation	30.0%
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	*$28,847,529*
	% Expended	*79.0%*
	SBE Participation	*43.0%*
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	$12,203,626
	% Expended	70.8%
	SBE Participation	28.6%
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	$48,700,00
	% Expended	57.2%
	SBE Participation	36.2%
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	*$8,105,085*
	% Expended	*47.4%*
	SBE Participation	21.8%
Schedule:		
Issues or Concerns:		