

MONTHLY REPORT

April 2016

Central Subway Project

San Francisco Municipal Transportation Agency (SFMTA)
San Francisco, CA

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PMOC Contract No.: DTFT6014D00010

Task Order No. 5

Project No.: FTA-13-0294

Work Order Number: 002

OPs Referenced: 01 and 25

CLIN 0002B

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Time on project: 2 years

EXECUTIVE SUMMARY

Project Description

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

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

Project Status

The Full Funding Grant Agreement (FFGA) was signed on October 11, 2012. Design is complete, and the project has been under construction since February 2010. *At the end of March 2016, the project was 58.22% complete based on expenditures.* There was one active construction contract: 1300 Stations and Systems/Trackwork. The 1252 Contract for construction of the twin subway tunnels achieved final completion on May 15, 2015. Determination of the final contract cost and financial close out of the 1252 Contract *is nearing completion. The contractor needs to repair a number of leaks in the tunnel and cross passages prior to contract close out.* The final contract price is likely to be close to the current contract amount.

*The 1300 Contract was 42.15% complete on the basis of incurred cost at the end of March 2016. Substantial completion was originally scheduled for February 2018, but the SFMTA Master Program Schedule currently forecasts substantial completion to be on December 11, 2018. The contractor's recent schedule updates have been rejected and the schedule information for the project is based on SFMTA's update of the construction schedule, which was completed in March 2016. **The Project Management Oversight Contractor (PMOC) is pleased that SFMTA now has a reliable schedule update tool that can be used to assess schedule recovery strategies and to analyze the root causes of the accumulated schedule delays to date. The PMOC remains concerned that the 1300 Contractor is unable or unwilling to deliver an acceptable construction schedule update to SFMTA.***

As a result of the forecast delay in the completion of station construction, the current program master schedule indicates that the Revenue Service Date (RSD) will be achieved on May 29, 2019, five months later than the date required in the FFGA. The entire schedule contingency in the program master schedule has now been consumed by the delays to the station construction, and the project schedule now has negative float. SFMTA and the contractor have established

new goals for completion of construction milestones for each of the work packages. *The milestone set for CTS construction would result in a reduction of the overall delay to completion of that work package of about two weeks.* Since CTS is driving the construction completion date, the time saving could result in recovery of some the forecast delay to the RSD. *However, it appears that work at UMS is close to the critical path, so further savings might require time savings for both work packages.* **In the opinion of the PMOC, setting of milestone targets has yet to result in recovery of previous schedule delays, so the effectiveness of setting the latest goals is uncertain.** SFMTA believes that the contractor is more focused on schedule performance than in the past and is optimistic that the latest milestone goals will be achieved. **In the opinion of the PMOC, the opportunities to recover the accumulated schedule delays will be more limited as time passes, so the effectiveness of the latest goals in reducing construction duration should be closely monitored.** *The PMOC will convene a schedule containment workshop in June 2016 to identify and evaluate potential schedule recovery strategies.*

Table 1 - Core Accountability Items

Project Status: (as of March 31, 2016)		Original at FFGA:	Current Estimate:
Cost	Cost Estimate	\$1,578,300,000	\$1,578,300,000
Contingency	Unallocated Contingency	\$74,722,000	\$24,749,524
	Total Contingency (Allocated Plus Unallocated, Including Approved Contract Changes)	\$185,500,000	\$80,150,875
Schedule	Revenue Service Date	12/26/2018	05/29/2019 (forecast)
Total Project Percent Complete	Based on Expenditures	58.22%	
	Based on Earned Value	59.18%	

Major Issues	Status	Comments/Planned Action
Schedule Contingency	Based on the latest program master schedule, there is negative schedule float of at least 5 months.	The minimum schedule contingency agreed to at this stage of the project is 6.0 months. The PMOC will convene a schedule containment workshop <i>in June</i> .

Major Issues	Status	Comments/Planned Action
Cost Contingency	The current Total Contingency is \$80.2 million. The FTA recommends a minimum contingency level of \$60 million.	The availability of excess cost contingency may make it possible to implement strategies to accelerate the construction work <i>at increased project cost, while maintaining the overall program budget.</i>
Technical Capacity and Capability	All management positions in the organization are filled, however a key senior manager is on Family Medical Leave.	The PMOC is assessing the effectiveness of the SFMTA CSP team in managing the project through routine on-site monitoring.
Date of Next Quarterly Meeting:		<i>August 4, 2016</i>

Earned Value (EV): \$933,961,694, a decrease of \$2.23 million from February. The basis for the estimate of earned value has been refined as a result of the updated project schedule.

Planned Value: \$1,191,972,303, an increase of \$17.18 million from February.

Actual Cost: \$918,869,526, an increase of \$10.92 million from February.

Cost Performance Index (CPI): 1.02. A value greater than 1 means that value of the work completed is more than the cost of the work (under budget) and less than 1 means that the value of the work is less than the cost of the work (over budget).

Schedule Performance Index (SPI): 0.78. SPI greater than 1 is ahead of schedule and less than 1 is behind schedule. SFMTA has identified the minimum acceptable SPI to be 0.90; the current SPI indicates unacceptable schedule performance.

The SPI declined slightly from February to March 2016. The basis for estimating planned and earned value has been modified due to the SFMTA's completion of its updated Master Program Schedule, with the current basis being more accurate than the previous basis.

Contingency

Cost Contingency

*The total available contingency (approved contingency less approved contract changes) is \$80,150,875, which is above the minimum required contingency of \$60 million and down \$2.88 million from February. Unallocated contingency is now at \$24.7 million, up slightly from February due to transfers of allocated contingency from the tunnel contract. **In the opinion of the PMOC, the overall available cost contingency is sufficient to provide reasonable assurance of on-budget completion of the project. However, the accumulated delays to the construction raise the potential for contractor time impact claims and associated extra costs. To date the contractor has not demonstrated that SFMTA has any responsibility for the delays.***

Schedule Contingency

The Program Master Schedule for the Central Subway Project now shows negative buffer float and a forecast RSD five months later than required. The agreed level of schedule contingency after demobilization of the tunnel work is 6.0 months. **In the opinion of the PMOC, there is a risk that the RSD will be missed by a few months.**

PMOC Observations, Opinions, and Concerns

With financial close-out of the tunnel contract nearly complete and the projected final contract cost within one percent of the original contract value, the cost and schedule performance of the tunnel contract has been exceptionally good.

The PMOC is pleased that SFMTA has completed its update of the as-built schedule for the 1300 Contract and its updated Master Project Schedule. SFMTA now has a reliable tool for assessing the time required to complete the project. The PMOC will now facilitate a schedule recovery workshop for the project to assist SFMTA in identifying the most promising strategies for reducing the duration of the remaining construction work and to assess how much of the accumulated delays can be expected to be recovered. The PMOC is concerned that the 1300 Contractor has not delivered an acceptable schedule update for the project in several months, which may hinder effective collaboration on implementation of the schedule recovery strategies.

The current program master schedule indicates that the RSD will be five months later than planned unless the duration of future activities can be reduced or more work can be accomplished concurrently. New schedule performance goals, if achieved, could save about two weeks of construction time on the critical path. Setting of schedule performance targets has yet to be effective in recovering accumulated schedule delays and the schedule performance target set for the Systems, Track, and Surface (STS) work package was missed, so progress toward the new goals should be closely monitored.

While SFMTA has been focusing on the schedule for work at CTS, which is on the current critical path, recovering five months of delay will likely require that time savings also be identified for work at UMS. In the opinion of the PMOC, it is unlikely that the project can achieve sufficient improvements in work productivity and/or extended work shifts and additional crews to recover from all of the accumulated delays and meet the required RSD of December 2018.

In the opinion of the PMOC, the trend and change management summary reports now being published by SFMTA improve the accuracy of forecasts of cost at completion and should help to expedite the completion of the contract modification process for justified contract changes. Based on the latest information from these reports, the total cost contingency, including unallocated contingency and less identified trends, of 9.7% of the potential remaining spending is sufficient to provide reasonable assurance of on-budget completion of the project. The available contingency is well above the recommended minimum of \$60 million. However, if efforts to recover the accumulated schedule delays are unsuccessful, there is a potential for

increased project cost. To date the contractor has not demonstrated that SFMTA is responsible for any of the accumulated delays.

In the opinion of the PMOC, unallocated contingency will likely need to be transferred to the 1300 Contract before work is complete. *The approved and identified potential changes for the contract total almost \$25 million, which is higher than the \$20 million allocated contingency for the contract. There is an additional \$4.2 million cost exposure from contractor claims/notices of planned claims as well as a potential for additional claims for denied change order requests.*

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A. PROJECT STATUS

Full Funding Grant Agreement (FFGA)

The FFGA was signed on October 11, 2012.

Design

Design is complete.

Construction

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

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

Contract 1252 Tunnel. This contract completed the construction of 1.5 miles of twin tunnels by tunnel boring machines and the tunnel portal and retrieval shaft. Final completion has been achieved, and financial close out *is nearing completion. The contractor needs to repair leaks in the tunnel and some of the cross passages before the contract can be closed out. Coordination of access to the tunnel for this work with ongoing station construction has been challenging.*

SFMTA expects that the final cost of the tunnel contract will be within about \$2 million of the original contract value, representing a cost increase of less than one percent, discounting extra scope that is not part of the federal project. In the opinion of the PMOC, the cost and schedule performance of the tunnel contract has been exceptional.

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

As of the end of March 2016, the construction of the Stations and Surface, Track, and Systems contract was 42.2% complete on the basis of cost and 44.9% complete based on the value of completed construction. The basis of estimation for the percentage of construction completed was updated with the completion of the revised Master Program Schedule, resulting in the reported percentage completion being lower for March than it was in February.

Union Square/Market Street Station (UMS): The new schedule performance goal for UMS is to install the concourse level (the first level below ground) struts and walers in the station box by September 1, 2016. *SFMTA reports that work is on track to achieve this milestone and that successful completion of this milestone would maintain the currently forecast completion date for the UMS work package.* The triangle formed by Market Street, the westbound lane of Ellis Street, and the western end of the Ellis Street Annex remained uncovered pending design and installation of a solution for the continuing water leakage at the seismic joint between the new UMS structure and the old Bay Area Rapid Transit (BART) station entrance structure. This issue

is not impacting the overall progress of work at UMS, *but the contractor is anxious to complete the work so that they can complete the street paving and turn the area over to SFMTA. At the south concourse, preparations for installation of a vertical drainage pipe were on hold pending removal of excavated soil. The contractor has put this work on hold to focus on critical path work for the work package. At the northern end of the station box, excavation of the soil from inside the box was on hold pending removal of an unidentified underground tank that was pierced during placement of the piles that form the temporary support of excavation walls of the box. The tank removal specialist had not been scheduled to complete the work as of the preparation of this report. The soil that was contaminated by the ruptured tank has been removed from the site. Placement of the first two phases of the concrete station box roof at O'Farrell Street was complete. Traffic control for phase three of the work was in place and work started on the third phase of the O'Farrell roof deck in early May. Work on this last phase of the station box roof was scheduled to be complete at the end of May. Jet grout placement was completed south of O'Farrell as scheduled. Jet grouting started north of O'Farrell on April 29 and was scheduled continue through May. The leveling course of shotcrete in the north concourse was completed in late March. Excavation to the first level of struts and walers in the north concourse was completed in April. The north headwall and piles will be prepared for strut and waler installation for the first level of support, which are scheduled to be placed during the week of May 23. Above the north concourse roof deck, Muni traction power duct banks remain to be demolished and reconstructed. TPC is awaiting negotiation of the price for the Proposed Contract Change (PCC) for this work. Meanwhile, placement of the curb, gutter sidewalk, and street surface was underway and is scheduled to be complete in mid-May. Demolition of portions of the UMS garage was complete and work to break into the north concourse from the garage area was due to be complete on May 13. Micropiles were being placed to support the garage structure along the Geary Street frontage, along with placement of the plaza level deck over the station entrance. **In the opinion of the PMOC, the delays to construction due to unforeseen utilities, underground storage tanks, and other conditions at UMS should largely be over. Once the roof deck is complete at the O'Farrell intersection, excavation should be able to proceed without interruption.***

Chinatown Station (CTS): *The established schedule performance goal for CTS is to complete the cross-cut cavern by July 12 (revised from June 15, 2016). The new SFMTA Resident Engineer (RE) for CTS started work on April 11 and is still becoming familiar with the work package. Excavation for installation of struts and walers at level 5 of the headhouse was completed on May 2. The first set of walers and struts was scheduled to be completed May 6. Additional struts and walers will be placed in June. Installation of the barrel vault tubes was completed and the tubes were filled with grout in April. The contractor broke through the headhouse slurry wall at the cross-cut cavern and started the Sequential Excavation Method (SEM) excavation of the cavern. The contractor is working two shifts per day and up to six days per week on this activity. As of the first week of May, work was three days behind the pace needed to meet the schedule performance goal of completing this excavation by July 12. The contractor was confident that he could recover the delay and achieve the identified milestone. **In the opinion of the PMOC,***

progress toward achievement of the new schedule performance goal for CTS is critical to the overall progress of the CSP. Progress toward achievement of the goal should be monitored closely.

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

Traffic remains shifted away from the east curb of 4th Street to allow installation of new utilities that will feed the expansion of the Moscone Convention Center, beginning with a 12" water pipe, followed by a 36" sewer force main, and then completed with a 24" water pipe. Progress on this work is on hold pending completion of fabrication of a manifold for the 12" waterline by San Francisco Water Department. Placement of struts at the concourse level of the headhouse was completed in April. Leaks that appeared in the vent shaft connecting to the headhouse were scheduled to be fully repaired on May 6. Excavation to the invert level of the headhouse was underway in early May and was scheduled to continue through May 26. Upon completion of the excavation, the contractor will begin to break through the lower portion of the headhouse slurry walls to create the connection to the station platform level. In the station box, the finished course of shotcrete was placed on the north headwall at the mezzanine level and was under review by SFMTA. The quality of the finished surface was reported to be excellent, although SFMTA was concerned regarding how the contractor would demonstrate that the finished shotcrete walls throughout the project were placed in the correct locations and according to the specifications. Pending approval of the north headwall shotcrete and resolution of the QC process for final shotcrete placements, the contractor will proceed to place the final walls for the mezzanine level through May. Beneath the mezzanine level, excavation to the concourse level of the station box was completed. The first concourse level deck section was poured on April 28. The second section of the concourse deck is scheduled to be placed on May 18.

Surface, Track, and Systems (STS): The schedule performance goal for this work package was to place the tunnel invert slab by April 25. *This goal was not achieved due to problems with the drainage grates for the slab. Despite changing the size of the grates to a size that the manufacturer had in stock, the initial placement of the tunnel slab is now scheduled to occur on May 11 in the northbound tunnel and May 12 in the southbound tunnel. The contractor is planning to accelerate the placement of subsequent sections of the tunnel invert slabs to one every three days, rather than one every four days as originally planned.* Muni Traction Power duct bank (MRY), alternative water supply system (AWSS), street lighting, traffic signal, and sewer work continued. Overhead Contact System (OCS) pole foundations were being installed for trolley bus lines in the areas affected by construction. *The critical completion of the cutover of AT&T and other telecom services to the newly constructed communication ducts was completed two weeks late, on May 3 and Tutor Perini Corporation (TPC) began demolishing the old duct bank. A portion of the old 78" sewer must be slip lined to reduce its diameter in order to enable a notch to be cut in the top of the sewer to accommodate an AWSS line that needs to cross over the sewer. Work on lateral connections to this portion of the main sewer line is also on hold*

until the slip lining can be done. Several conflicts have been discovered between a private communications duct (Level 3 and XO communications) and sewer lines and the planned trackway. Another new conflict between PG&E facilities and a portion of a new 16" waterline have been identified, and PG&E is determining what changes need to be made to its facilities. The PMOC was informed that a repair for the minor problems with the geometry of the curves connecting the T Line to the Embarcadero has been approved and the related Contractor Non-Conformance Report (CNCR) will be closed out. Problems with the grounding of one of the track circuits at 4th and King are temporarily resolved, but investigation into the adequacy of the material used to isolate the track system from the surrounding ground is still underway by HNTB. The new switch machines at the 4th and King intersection have been reported to be going out of adjustment, with the machines requiring eight different adjustments to date. However, one of the new machines has not required any adjustment. The contractor provided a preliminary operations and maintenance manual from the manufacturer which is under review to determine if maintenance procedures need to be revised. **In the opinion of the PMOC, numerous utility conflicts remain to be resolved before the trackway construction in the at-grade section of the project can proceed. Fortunately this work is not on the critical path for program completion.**

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

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

Bay Area Rapid Transit (BART)

The close out of Contract 1252 depends on the removal of monitoring equipment from BART facilities. Work plans have been re-submitted to BART, but the target for completion of the removals at the end of April 2016 was not achieved.

Caltrans

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

CPUC

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

San Francisco Public Utilities Commission (SFPUC)

No updates to report.

San Francisco Department of Public Works (SFPDW)

No updates to report.

San Francisco Parks and Recreation Department

No updates to report.

Private Property Owners

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

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

Vehicle Status of Design, Procurement, Testing, and Integration

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

Real Estate

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

Labor Relations and Policies

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

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

No updates to report.

B. PROJECT MANAGEMENT PLAN AND SUB-PLAN IMPLEMENTATION**Project Management Plan (PMP)**

The latest update of the PMP was received by the PMOC in early April 2016. The PMOC conducted a review of the revised PMP focusing on the quality program and the organization reporting structure for the quality functions. The PMOC concluded that SFMTA had addressed its comments relative to the independence of the quality function from the project management team. However one section of the PMP text contained a minor inconsistency regarding the reporting hierarchy for the SFMTA Quality Manager. This discrepancy was shown to SFMTA and it was agreed that the issue would be addressed in the next update of the PMP. Another minor discrepancy in the position title for one of the project staff members was identified and it was also agreed that this issue would be addressed in the subsequent update of the PMP due in 2017.

Environmental Assessment/Mitigation Plan/Archaeological Plans

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

Real Estate Acquisition Management Plan (RAMP)

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

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

See section F.

Safety and Security Management Plan (SSMP)

See section G.

Risk and Contingency Management Plan (RCMP)

See section H.

C. PROJECT MANAGEMENT CAPABILITY AND CAPACITY

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

Agency Staff

Total project staff levels are close to the planned values. *SFMTA reported that two additional staff members have been added to the project team, including an office engineer and a change evaluation specialist.* The Deputy Program Director – Project Services is still on leave. **In the opinion of the PMOC, the addition of project staff should improve the CSP Team’s ability to track and forecast schedule performance and to resolve the outstanding and future issues associated with contract changes.** *SFMTA is closing the CSP construction office at 821 Howard Street. Most of the management staff will relocate to available space at 530 Bush Street, where both SFMTA and TPC maintain office space. Construction trailers at each work site will accommodate some of the relocated staff.*

Contractor Staff

SFMTA reported that the contractor has hired a new Quality Control Manager.

D. PROJECT COST STATUS

Project Cost Control Systems

SFMTA continued to maintain the Trend Log and logs of Change Order Requests (CORs) and PCCs for Contract 1300 using Contract Management 13 (CM13). The Trend Log includes all potential changes in contract value, including items that, in the opinion of the CSP staff, are not merited and new items for which merit has not been determined. The companion contract change management log includes items that have been determined to have merit and are progressing through negotiations toward a contract modification (CMod). SFMTA is working to improve the timeliness of processing determinations of merit as well as the progression of pending contract changes and completion of CMods by creating summary tables of the numbers of items that are in the various stages of processing. *A total of \$2.8 million in new changes were approved in March, with changes to both the 1252 and 1300 Contract being executed.*

Reports showing the status of contract changes are reviewed weekly at the status meetings for each of the work packages in the 1300 Contract. **In the opinion of the PMOC, the trend and change management summary reports now being published by SFMTA improve the accuracy of forecasts of cost at completion and, along with the added resources for assessment of merit and estimating costs, should help to expedite the completion of the contract modification process for justified contract changes.** *A total of 23 contract modifications had been executed for the 1300 Contract as of May 4, 2016, with five new CMods executed since February 20.*

Project Cost (As of February 29, 2016)

Cost estimate: \$1.5783 billion.

Total contingency: \$80.15 million (minimum contingency is \$60 million), down \$2.88 million from February.

Total net incurred costs: \$918,869,527, an increase of \$10.92 million from February (58.22% of the total project budget).

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

Earned Value (EV): \$933,961,694, a decrease of \$2.24 million from February. The decrease in earned value was caused by a change in the basis for calculation of earned value associated with the update to the program master schedule.

Planned Value: \$1,191,972,303, an increase of \$17.18 million from February.

Cost Performance Index (CPI): 1.02.

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

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

Project Cost Trends

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

Table 2 - Contract, Budget, and Trends for Active Construction Projects¹

	1252 – Tunnel	1300 Stations, STS
Original Contract	233,584,015	839,676,400
Approved Contingency	2,329,485	20,000,000
Extra Budget for Non-Project Costs	6,173,508	
Approved Budget	235,913,500	859,676,400
Approved Changes	1,643,744	2,933,000
Current Contract (1252 does not include non-project costs)	235,227,759	842,609,400
Remaining Contingency	685,741	16,992,000
Potential Changes (Trends)	170,654	21,778,182
Potential Contract	235,398,413	864,387,582

	1252 – Tunnel	1300 Stations, STS
Contingency Less Trends	515,087	(4,786,182)
Spent to Date	234,881,397	362,881,108
Potential Left to Spend	517,016	501,506,474
Contingency Less Trends as % of Potential Cost to Complete	99.6%	-1.0%

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

The remaining contingency, less identified trends, represents 100% of the potential left to spend for Contract 1252. After potential changes are accounted for, there is no contingency remaining for Contract 1300. **In the opinion of the PMOC, the 1300 Contract contingency will need to be increased by transferring unallocated contingency to this contract.** The combined allocated contingency for all construction work less identified trends is now a negative number. *In the opinion of the PMOC, although it has been reduced since last month, the allocated contingency for the 1252 Contract still is probably greater than the amount required to assure final close out of the contract within the budget.* The allocated contingency for the 1300 Contract appears insufficient to complete the contract, and the overall contingency allocated to construction is inadequate for the percentage completion level of construction. However, there appears to be sufficient unallocated contingency and excess allocated contingency from other program components for successful completion of the program.

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

Table 3 - Budget and Contingency Status for Central Subway Project²

	Total Construction	Right of Way	Vehicles	Professional Services	Unallocated Contingency	Total Program
Original Contract	1,130,842,776	36,511,799	24,108,712	310,518,041		1,501,981,328
Approved Contingency	30,070,728	1,000,000	13,076,653	18,221,079	24,749,924	87,118,384
Extra Budget for Non – Project Costs	6,173,508					
Approved Budget (w/o Extra Launch Shaft Cost)	1,160,913,504	37,511,799	26,385,653	328,739,120	24,749,924	1,578,300,000
Approved Changes	11,232,987	(4,265,478)	(10,799,712)			(3,832,203)
Current Contract	1,142,075,763	32,246,321	13,309,000	310,518,041	24,749,924	1,498,149,125
Remaining Contingency	18,837,741	5,265,478	13,076,653	18,221,079	24,749,924	80,150,875

	Total Construction	Right of Way	Vehicles	Professional Services	Unallocated Contingency	Total Program
Potential Changes (Trends)	21,948,836	-	-	-		21,948,836
Potential Contract	1,164,024,599	32,246,321	13,309,000	310,518,041		1,520,097,961
Contingency Less Trends	(3,111,095)	5,265,478	13,076,653	18,221,079	24,749,924	58,202,039
Spent to Date	657,204,826	30,646,005	2,147,204	228,871,492		918,869,527
Potential Left to Spend	506,819,773	1,600,316	11,161,796	81,646,549		601,228,434
Contingency Less Trends/Potential Left to Spend	-0.6%	329.0%	117.2%	22.3%		9.7%

² As reported in the March 2016 Central Subway Project Monthly Progress Report – SFMTA.

Change Order Control

SFMTA now estimates that additional CMods with a net increase in contract value of \$170,654 will be executed as part of contract close out for the 1252 Contract. The projected contract cost for the tunnel work has increased by \$427,560 in the past month. Based on the expected final contract value, change orders for the base work are forecast to represent less than one percent of the original contract amount, which represents exceptionally good change order control.

SFMTA is maintaining its management tools for tracking potential contract changes for the 1300 Contract. The latest summary report is titled “CN1300 Trend Statistics” and is dated May 4, 2016. This report shows that 23 contract modifications have been approved for a net increase in the contract value of \$3,008,000, representing no change since April 6. Change Order Requests (generated by the contractor) that have been determined to have merit and Proposed Contract Changes (generated by SFMTA) have an expected value of \$19,122,175 in increased contract value, an increase of \$1.81 million since early April. An additional 184 items are being tracked in the Trend Log with a net value of \$13.52 million in possible contract value increases. Of these, 147 have been judged by SFMTA to be without merit, but are being carried at a reduced value in the trend to address potential future claims. A further 116 items have been voided and are carried at no cost. There are eight notices of potential claims by the contractor, and 19 items are “open” or “new” and awaiting a determination of merit.

SFMTA reported that TPC is now insisting on a lump-sum pricing agreement prior to the start of changed work and the contractor is being inflexible in negotiations of the lump sum pricing. To avoid delaying progress of the work, SFMTA is planning in some cases to use the unilateral change process to address the problem of reaching agreed pricing for changes. In other cases, SFMTA can direct the contractor to start work on force account, which raises the need for accounting for the work and the associated disputes regarding the reporting requirements and what work is approved as relevant to the change. **The apparent escalation in the level of conflict associated with changes to the contract indicates a higher potential for claims from**

the contractor. SFMTA appears to be handling the issues appropriately but preparing for lump sum negotiations on all changes is requiring a major commitment of SFMTA resources.

The most recent version of the complete Trend Statistics Summary for the 1300 Contract dated May 2, 2016 shows a total potential increase in contract cost of \$38,332,321, including the \$3.0 million in contract cost increases executed thus far. The total estimated cost impact of the identified trends increased by about \$4.77 million from April to May. The following trend items with potential cost increases in excess of \$250,000 are identified in the Trend Log:

1. Changes to traffic signals and street lights - \$298,307
2. Change to grade 50 steel from specified grade 70 steel (due to availability and Buy America issues) - \$572,884
3. Contaminated soil at YBM guidewall excavation - \$257,594
4. Extra trucking costs for contaminated soil at CTS - \$2,274,225
5. Harder rock than anticipated for CTS slurry wall excavation - \$2,820,600
6. Delays to installation of tangent piles at UMS - \$1,082,380
7. *Utility conflicts with 12" water line at UMS - \$335,468 (reduced from \$338,265)*
8. Utility conflicts with sewer line installation at UMS - \$744,465
9. Changes in construction sequence for UMS Garage - \$500,000
10. *Obstructions to jet grout placement at UMS - \$1,451,120 (increased from \$1,279,410)*
11. *Change to Irwin brand switch machines - \$389,965 (new)*
12. Additional instrumentation for detection of ground movement - \$429,777
13. Changes in installation requirements for art glass at UMS - \$681,978
14. Time impacts due to power pole conflict during demolition at CTS - \$2,412,252
15. New emergency stop switch for CSP operations - \$315,001
16. Removal of temporary facilities from 1252 Contract in tunnel - \$616,354
17. 12" water line conflict at YBM - \$292,036
18. Additional traffic control requirements at 4th and King - \$675,001
19. Additional traffic control requirements for STS work package - \$1,032,302
20. Changes to AWSS layout at 4th and King - \$295,269
21. Cost of changes to the design to Chinatown Station to accommodate the plaza requested by the community - \$4,500,001 (costs will be paid by funds outside the program)
22. Contractor-claimed change in contract requirements for pre-loading permanent struts at UMS - \$250,001.

23. Contractor claimed change in contract requirements related to the design loads for permanent struts acting as temporary support - \$2,700,001
24. *Changes to utility design at YBM - \$627,854 (new)*
25. Contractor-claimed delay costs due to re-sequencing of work at CTS - \$250,001
26. Missing conduit between manholes at UMS - \$250,001
27. Additional quantities for CMod 19 at CTS - \$300,001
28. Change in vent for emergency generator at all stations - \$500,001
29. *Change in support design for Union Square garage - \$500,001 (new)*
30. *Change to soil nails and shotcrete from sheet piles at Union Square garage - \$1,164,129 (new)*

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

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

Funding and Expenditures

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

Table 4 - Project Funding

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

E. PROJECT SCHEDULE STATUS

*After having no master program schedule updates for the CSP in January and February 2016, SFMTA produced an update representing progress through March 2016 in April. SFMTA reported that it had again rejected the contractor's schedule submittal for March 2016 due to logic problems. SFMTA's update of the project schedule was reported to include the recommendations from the November 2015 schedule workshop facilitated by the PMOC. **The PMOC is pleased that SFMTA has produced a more reliable schedule tool that provides better certainty regarding the current status and likely completion date for the project. The PMOC is concerned that TPC has been unwilling or unable to produce its own acceptable schedule update. Without a proper schedule from the contractor, it may be more difficult to agree on schedule recovery strategies and to resolve disputes regarding the responsibility for past schedule delays.***

*The March 2016 schedule update continues to indicate that the construction work is about 10 months behind schedule. The critical path for the construction work continues to flow through the construction of CTS. The projected RSD forecast is now *May 29, 2019*, five months later than planned. There is negative float on the project critical path and time savings must be identified for the remaining work if the project is to be completed on time.*

The PMOC facilitated a Schedule Workshop with SFMTA project management and project controls staff on November 18 and 19, 2015. The goal of the workshop was to identify strategies to help recover the accumulated delays to the Stations, Systems, and Surface works contract and to achieve the RSD required in the FFGA for the project. Objectives were to:

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

As the result of the workshop, an initial proposed action plan for developing the necessary tool from the current TPC schedule includes the following steps:

1. SFMTA makes adjustments to schedule logic in TPC schedule.
2. SFMTA evaluates the resulting schedule and finalizes the recommended logic changes.
3. SFMTA reviews the resulting schedule tool with TPC.
4. SFMTA and TPC agree on refinements.
5. Final schedule refinements made by TPC or SFMTA, and revised schedule accepted for ongoing use.

6. Routine schedule updates continue with the revised schedule. SFMTA continues to make its own updates based on three-week look-ahead schedules and actual progress as a check on TPC schedules. Monthly meetings held to resolve any differences.
7. SFMTA (and TPC) evaluate changes to work sequence, options for acceleration, and other strategies for schedule recovery. Mutually agreed recovery strategies implemented in revised schedule.

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

As of the March 2016 SFMTA Progress Report for CSP, SFMTA had completed items 1 through 5, but the contractor had yet to accept SFMTA's recommended schedule improvements and had not submitted a schedule update incorporating those improvements. SFMTA reported that the contractor understands and generally accepts the schedule requirements. SFMTA expected the contractor to include the required modifications to the schedule to bring it into compliance with contract requirements in the contractor's April schedule update. SFMTA reported that the contractor continues to be very focused on the project schedule and is working to achieve the schedule performance milestones identified for each work package. SFMTA has added two staff members to support the project scheduling function and is working to further refine the historical dates in its update of the as-built project schedule. A second schedule workshop has been scheduled for June 2016 to identify, evaluate, and prioritize schedule recovery strategies for implementation.

As a means of encouraging better collaboration among the project participants, SFMTA and TPC have been identifying interim progress milestones to track the completion of construction work. To date, the record of meeting the milestone target dates has been mixed. New performance targets have been identified for work on the critical path for the project, which flows through the excavation for CTS, as well as the other three construction work packages. Table 5 shows the new milestones and the current status for each. ***In the opinion of the PMOC, the latest performance milestones, if achieved, could reduce the accumulated delay to the construction work by about two weeks. Unfortunately, the milestone for the STS work package was missed. Since that work package is not on the critical path, the delay in achieving that milestone does not impact the project completion date.*** Given the past record of lack of achievement of identified construction progress targets, the effectiveness of the new milestones in advancing the construction work remains to be seen.

Table 5 - Interim Milestones for CTS Construction Progress⁴

Milestone	Target Date	Status
Complete cross-cut cavern at CTS	July 12, 2016	Three days behind the extended due date
Install concourse level struts and walers at UMS	September 1, 2016	On track
Complete invert slab for station box at YBM	September 15, 2016	On track

Milestone	Target Date	Status
Place tunnel invert slab	April 25, 2016	Milestone missed, projected completion on May 12, 2016

⁴ SFMTA Management Meeting, 5/2/2016

Project Schedule Data

Earned Value (EV): \$933,961,694, a decrease of \$2.24 million from February. The decrease in earned value was caused by a change in the basis for calculation of earned value associated with the update to the program master schedule.

Planned Value: \$1,191,972,303, an increase of \$17.18 million from February.

Schedule Performance Index (SPI): 0.78. SPI greater than 1 is ahead of schedule and less than 1 is behind schedule. SFMTA has identified the minimum acceptable SPI to be 0.90; the current SPI indicates unacceptable schedule performance. The SPI declined from the previous reporting period, with the value being affected by the change in the schedule and the basis for estimating both planned and earned value. SPI must increase if the project is to be completed on time.

SPI is a measure of schedule efficiency on a project. It is the ratio of earned value to planned value. An SPI equal to or greater than 1 indicates more work was completed than planned and a value of less than 1 indicates less work was completed than planned. A value of equal to or greater than 0.9 reflects satisfactory performance, considering the margin of error in estimating both earned value and planned value. The current value of 0.78 indicates that the project is significantly behind schedule.

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

Table 6 - Schedule Milestones

(P = Planned Date, A = Actual Date, F = Forecast Date)	
Preliminary Engineering (PE):	Authorized in July 2002 (A)
Record of Decision:	Issued November 26, 2008 (A)
Final Design (FD):	Authorized in January 2010 (A)
FFGA Request:	Submitted September 2011 (A)
FFGA Executed:	October 11, 2012 (A)
Ground Breaking: (Utility Relocation Contract)	February 9, 2010 (A)
Tunnel excavation complete (hole through):	June 2, 2014 (SB); June 11, 2014 (NB) (A)
Cross passages complete:	December 20, 2014 (P); April 15, 2015 (A)
Tunneling substantial completion:	April 15, 2015 (A)
Station construction Notice to Proceed (NTP):	June 17, 2013 (A)
Station construction substantial completion:	February 24, 2018 (P), December 7, 2018 (F)
RSD:	December 26, 2018 (P), May 29, 2019 (F)

The current master schedule incorporating the approved 1300 Contract baseline schedule and updated actual progress through *March 2016* reflects negative buffer float and late completion of the project.

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

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

Critical Path Summary (*Baseline Schedule*)

CTS Install Guidewalls, Slurry Walls, and Install Surface Deck (complete)

CTS Excavate Headhouse and Bracing (complete)

CTS Sequential Excavation Method and Install Supports (*underway*)

CTS Headhouse Structural Concrete/Remove Bracing

CTS Install Mechanical, Electrical, and Plumbing (M/E/P) Equipment

CTS Start Up and Testing

CTS P-1254R Commissioning of Station

Safety and Security Certification/Pre-Revenue Activities

RSD on December 26, 2018 (currently forecast *May 29, 2019*)

Three Month Look-ahead

The following activities are planned over the next three months:

1300 Contract

UMS

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

Continue Union Square Garage (USG) *roof deck installation, mini-pile installation*, and shear wall installation for permanent structural support for north concourse entrance

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

Demolish existing structures at the BART Powell Street entrance

Continue jet-grout operations

Continue compensation grout operations

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

Restore Stockton Street curb, gutter, sidewalks, and pavement

Continue excavation of the north concourse to the intermediate level of struts

CTS

Excavate to the level 5 struts and walers of the headhouse

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

Place floor slab and walls of the north access shaft

YBM

Place shotcrete walls above the mezzanine level in the station box

Complete placement of concourse level slab

Excavate station box to the platform level

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

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

STS

Sewer installation and repair

AWSS installation

Muni ductbank installation

Installation of fiber optic cable by AT&T

Installation of the tunnel invert slab

Start installation of tunnel lighting

Install overhead contact system support poles

Placement of tunnel drainage and invert slab

The PMOC expects to attend the following meetings:

- Weekly Management (first Monday of each month *and on June 20*)
- Weekly Contract 1300 Construction Progress Meetings (first Tuesday and first Wednesday of the month *and on June 21 and 22*)
- 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 7, 2016; and August 2, 2016. *The July month end meeting will be canceled due to the Independence Day Holiday.*
- *Schedule workshop meetings June 22, 23*
- FTA/QPRM scheduled for *August 4, 2016*

F. QUALITY ASSURANCE AND QUALITY CONTROL

QA/QC Plan Implementation

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

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

The contractor's commitment to quality and the execution of the contractor's Quality Management Plan have been concerns of SFMTA for the 1300 Contract. SFMTA completed an audit of the TPC Quality Control system, including staff and procedures, in May 2015. That audit was completed in early June 2015, identifying six corrective actions to be taken by the contractor. The findings of the audit have yet to be closed.

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

- Assurance that all Requests for Information (RFIs), submittals, and USE-AS-IS and REPAIR dispositioned CNCRs related to a particular concrete placement, have been approved by the SFMTA REs. Practically, SFMTA REs have imposed a concrete placement hold point for all concrete placements to collectively ensure that the contractor has performed all work to the requirements of the Contract Documents, i.e., all RFIs, CNCRs, and submittals have been approved and acceptably executed. *SFMTA's Quality Manager (QM) has indicated that this process has been successful in avoiding problems with concrete pours.*

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

In addition to these items listed in the monthly progress report, the PMOC noted that the process for confirmation that shotcrete wall and ceiling placements meet contract requirements is not yet resolved between SFMTA and TPC.

As of May 4, 2016, 190 CNCRs had been filed by TPC's Quality Manager (13 more than in April). Seven new items were under review, three other items had responses identified but not yet approved, the proposed responses to two items were disapproved, and 13 items had approved responses that were not yet implemented. 138 items were closed (13 more than in April) and 27 items had been voided. The open CNCRs are not impeding the progress of construction. The PMOC conducted a Quality Review of the CSP in September, and a draft report was delivered to FTA for review in late September 2015. The report documenting this review was finalized in early November 2015. The report identified recommended refinements to the organization charts and descriptions of certain staff positions' quality-related responsibilities to clarify the quality assurance organization. The report also recommended that executive management support for the quality program be demonstrated through approval signatures on quality plans by TPC and SFMTA executive management. The PMOC's Quality Review of the project concluded that the SFMTA staff is implementing the SFMTA QA Program as described in the SFMTA Quality Management Plan (QMP). The fundamental implementation of the SFMTA quality program and SFMTA management's support of the program were readily apparent during the PMOC's QA

program review. The recent update of the PMP includes changes to the reporting structure and position descriptions reflecting the PMOC's comments from the Quality Review. However, the text in one section of the PMP has an incorrect description of the reporting structure for the SFMTA QM. SFMTA has agreed to address this minor inconsistency in its next update of the PMP. The PMOC's Quality Review will now be considered closed and will not be addressed in future monthly reports.

G. SAFETY AND SECURITY

Safety and Security Management Plan (SSMP)

An updated SSMP Revision 2, dated February 2, 2014, was submitted to FTA on May 2, 2014. The SSMP outlines the plans needed prior to revenue operations. These plans include the Rail Activation Plan (RAP), the System Integration Test Plan, the Safety and Security Certification Plan (SSCP), and the Pre-Revenue Operations and Start-up Plan. SFMTA has completed the SSCP, which is being used to guide safety certification activities. The initial draft of the RAP was completed with the latest update of the PMP. The System Integration Test Plan and the Pre-Revenue Operations and Start-up Plan have not been completed and are expected to be provided with the next PMP update.

Fire and Life Safety/Safety and Security Issues

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

Construction Safety

The 1300 Contract is maintaining an excellent safety record, with a total of four recordable and four lost time incidents since the project start (one incident occurred in March 2016). The performance metrics relating to accidents per working hour are well below the OSHA goals for similar construction. The current accident records for the 1300 Contract are shown in Table 7.

Table 7 - Construction Safety Data

<i>Through March 2016</i>	No. of Incidents	Incident Rate	Goal
1300 Contract			
OSHA Recordable Accidents	4	0.78	<3.4
Job Transfer/Restricted Duty Incidents	0	0	NA
Lost Time Incidents	0	0	<1.6
Total Incidents	4	0.78	NA

<i>Through March 2016</i>	No. of Incidents	Incident Rate	Goal
Hours Worked	1,024,001		

H. PROJECT RISK, RISK MANAGEMENT, AND RISK MITIGATION

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

The Contract 1300 baseline schedule was adopted in early December 2014. Twelve schedule updates have been completed by the contractor, accepted by SFMTA, and incorporated into the Master Program Schedule. The schedule risk assessment update is now expected from the CSP after the schedule tool in P6 is further enhanced and a recovery schedule is produced. The risk assessment would be conducted to assess the probability that the recovery schedule will result in the project meeting the required RSD. The timing of the risk assessment will be determined in the coming months.

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

- *Risk 237 – non-conforming work not identified, resulting in costs and delays for re-work. The SFMTA Quality Manager (QM) noted that CNCRs are being issued on a timely basis and, in the case where SFMTA’s QA staff identify quality issues, there is now little push back from the contractor. **This appears to be a much improved situation from several months ago, when the contractor was reluctant to acknowledge and address non-conforming work.***
- *Although the quality process has been running more smoothly in recent weeks, the SFMTA QM noted that TPC has a new QC Manager and that “the jury is still out” regarding his effectiveness. There could be an increased risk of ineffective processing of CNCRs if the new QM does not continue the improvements initiated by the outgoing QM.*
- *Schedule risk was discussed, and the SFMTA Program Manager stated that the focus of the entire team is on not falling further behind. **The PMOC noted that recovering the accumulated delays was not mentioned as a goal.***
- *Risk 100 – Delays due to procurement issues with long-lead items. Tracking of specific long-lead items was started in January. Elevator and escalator dimensional issues are the major current concern. The designer needs to resolve the changes needed to*

*accommodate the available equipment so that procurement can proceed. **This item has urgent status and is being addressed up to the senior management level at both SFMTA and TPC.***

- *Risk 204 – Delays due to AT&T not meeting the schedule for abandoning its facilities in at-grade section of the line. This risk is ready for retirement, as AT&T has abandoned the ducts and demolition has started.*
- *Risk 205 – Prolonged contract modification process leads to poor relationships between the contractor and SFMTA. This risk appears to be affecting progress, as TPC is now insisting on a lump-sum pricing agreement prior to the start of changed work and TPC is being inflexible in negotiations of the lump sum pricing. SFMTA is proposing to use the unilateral change process to address the problem of reaching agreed pricing for changes. In other cases, SFMTA can direct the contractor to start work on force account, which raises the need for accounting for the work and the associated disputes regarding the reporting requirements and what work is approved as relevant to the change. **The apparent escalation in the level of conflict associated with changes to the contract indicates a higher potential for claims from the contractor. SFMTA appears to be handling the issues appropriately but preparing for lump sum negotiations on all changes is requiring a major commitment of SFMTA resources.***
- *Risk 246 – Risk that design changes are not captured in as-built information. This risk is related to the discussion held at the CMB relating to the handling of design changes that originate from contractor RFIs. The group reiterated that design changes cannot be implemented through RFI responses and must be addressed with PCCs.*

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

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

I. ACTION ITEMS

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

APPENDIX A. LIST OF ACRONYMS

APTA	American Public Transportation Association
ARS	Air Replenishment System
AWS	American Welding Society
AWSS	Alternative Water Supply System
BART	Bay Area Rapid Transit
BCE	Baseline Cost Estimate
BRT	Bus Rapid Transit
Caltrans	California Department of Transportation
CAR	Corrective Action Request
CFR	Code of Federal Regulations
CLIN	Contract Line Item Number
CM13	Contract Management 13
CMB	Configuration Management Board
CMod	Contract Modification
CNCR	Contractor Non-Conformance Report
COR	Change Order Request
CPI	Cost Performance Index
CPUC	California Public Utilities Commission
CQM	Contractor's Quality Manager
CSP	Central Subway Project
CTS	Chinatown Station
CWI	Certified Welding Inspector
DF	Designated Function
EV	Earned Value
FD	Final Design
FEIR	Final Environmental Impact Report
FEIS	Final Environmental Impact Statement
FFGA	Full Funding Grant Agreement
FLSC	Fire and Life Safety Committee
FMP	Fleet Management Plan
FRA	Federal Railroad Administration
FTA	Federal Transit Administration
IRP	Independent Review Panel
LONP	Letter of No Prejudice
LRT	Light Rail Transit
LRV	Light Rail Vehicle
M/E/P	Mechanical, Electrical, and Plumbing
MMRP	Mitigation Monitoring Reporting Program
MOU	Memorandum of Understanding

MPS	Master Project Schedule
MRY	Muni Traction Power System
Muni	Common Public Reference to SFMTA
NCN	Notice of Non-conformance
NCR	Non-conformance Report
NEPA	National Environmental Policy Act
NTP	Notice to Proceed
OCS	Overhead Contact System
OHA	Operational Hazard Analysis
O&M	Operations & Maintenance
OP	Oversight Procedure
PCC	Proposed Contract Changes
PE	Preliminary Engineering
PHA	Preliminary Hazard Analysis
PMOC	Project Management Oversight Contractor
PMP	Project Management Plan
PTMISEA	Public Transportation Modernization, Improvement, and Service Enhancement Account
QA/QC	Quality Assurance/Quality Control
QMP	Quality Management Plan
QPRM	Quarterly Progress Review Meeting
QTR	Quarter
RAMP	Real Estate Acquisition Management Plan
RAP	Rail Activation Plan
RCMP	Risk and Contingency Management Plan
RE	Resident Engineer
RFI	Request for Information
ROD	Record of Decision
RSD	Revenue Service Date
SBE	Small Business Enterprise
SCIL	Safety Certifiable Item List
SCP	Safety Certification Plan
SEIS	Supplemental Environmental Impact Statement
SEM	Sequential Excavation Method
SEPP	Security and Emergency Preparedness Plan
SFDPW	San Francisco Department of Public Works
SFFD	San Francisco Fire Department
SFMTA	San Francisco Municipal Transportation Agency
SFPUC	San Francisco Public Utilities Commission
SIT	Systems Integration Test

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

APPENDIX B. SAFETY AND SECURITY CHECKLIST

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

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

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

Central Subway Project Overview			
Project mode (Rail, Bus, BRT, Multimode)	Light Rail Transit		
Project phase (Preliminary Engineering, Design, Construction, or Start-up)	Construction		
Project Delivery Method (Design/Build, Design/Build/Operate/Maintain, CM/GC, etc.)	Design-Bid-Build		
Project Plans	<i>Version</i>	<i>Review by FTA/FRA</i>	Status
Has the grantee verified conformance with safety and security requirements during testing, inspection, and start-up phases?	N		Project is in construction, with RSD more than three years in the future.
Does the grantee evaluate change orders, design waivers, or test variances for potential hazards and/or vulnerabilities?	Y		
Has the grantee ensured the performance of safety and security analyses for proposed work-arounds?	N/A		
Has the grantee demonstrated through meetings or other methods, the integration of safety and security in the following: <input type="checkbox"/> Activation Plan and Procedures <input type="checkbox"/> Integrated Test Plan and Procedures <input type="checkbox"/> Operations and Maintenance Plan <input type="checkbox"/> Emergency Operations Plan	<i>In process</i>		Currently being developed. An Integration Matrix has been implemented for all disciplines including safety and security concerns. Initial draft of the Rail Activation Plan has been completed.
Has the grantee issued final safety and security certification?	N		Project is in the construction phase.
Has the grantee issued the final safety and security verification report?	N		Project is in the construction phase.
Construction Safety			
Does the grantee have a documented/implemented Contractor Safety Program with which it expects contractors to comply?	Y		Health and Safety Construction Safety Standards Revision 3, June 27, 2012.

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

Central Subway Project Overview			
Project mode (Rail, Bus, BRT, Multimode)	Light Rail Transit		
Project phase (Preliminary Engineering, Design, Construction, or Start-up)	Construction		
Project Delivery Method (Design/Build, Design/Build/Operate/Maintain, CM/GC, etc.)	Design-Bid-Build		
Project Plans	<i>Version</i>	<i>Review by FTA/FRA</i>	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:	<i>May 13, 2015</i>
Project Name:	Central Subway Project (CSP) New Starts Light Rail Transit
Grantee:	San Francisco Municipal Transportation Agency (SFMTA)
FTA Regional contact:	Mr. Jeffrey S. Davis
FTA Headquarters contact:	Ms. Kim Nguyen

Scope

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

Schedule

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

59.17% Percent Complete Based on Progress (March 2016 data)

Cost

\$764 million	Total Project Cost (\$YOE) at Approval Entry to PE
\$1,578 million	Total Project Cost (\$YOE) at Approval Entry to FD
\$1,578 million	Total Project Cost (\$YOE) at FFGA signed
\$TBD million	Total Project Cost (\$YOE) at Revenue Operations
\$1,578 million	Total Project Cost (\$YOE) at date of this report including \$0.00 in Finance Charges
<i>\$918.87 million</i>	Amount of Expenditures at date of this report from Total Project Budget of \$1,578 million
<i>58.22%</i>	Percent Complete based on Expenditures at date of this report
<i>\$24.75 million</i>	Unallocated Contingency remaining
<i>\$80.15 million</i>	Total Project Contingency (allocated and unallocated contingency as reported by CSP)
\$60 million	Minimum Total Project Contingency revised on September 5, 2012 PMOC review of Contingency Management Plan

	AT HOLD POINTS	QTR	Minimum Contingency Levels	Revised Levels
1A	Hold Point 1a – Tunnels 100% designed February 2011 (Actual)	1Q11	280	280
1B	Hold Point 1b – CTS 100% designed June 2012 (Actual)	4Q11	250	240
1C	Hold Point 1c – 40% Bid (Tunnel and CTS)	2Q12	225	200
1D	Hold Point 1d – FFGA Award October 2012 (Actual)	3Q12	-	180
2	Hold Point 2 – Commence CTS / UMS construction (Actual June 17, 2013)	2Q13	160	160
3	Hold Point 3 – Demobilize Tunnels (Actual April 15, 2015)	2Q15	140	140
4	Hold Point 4 – Stations to platform levels (CTS/YBM) November 2016	4Q16	60	60
5	Hold Point 5 – Complete CTS / Tunnels systems inst. April 2018	2Q18	25	25
RSD	PMOC / FTA RSD	4Q18		
CURRENT TOTAL CONTINGENCY \$80.15 Million				



APPENDIX D. TOP PROJECT RISKS

The Project Risk Register was updated in early 2015. The following risks were discussed at the May 2016 risk mitigation meeting.

Top Risks Discussed in the Previous Month:

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

#233 – Related to the quality of the shotcrete lining substitution proposed by TPC being inferior. *This risk continues, but SFMTA has approved the test panels prepared by the contractor, which demonstrated acceptable finished quality for the shotcrete surfaces. The first full-scale wall placement at the north concourse of YBM resulted in very high quality. All of the nozzle operators working on shotcrete are certified. SFMTA and TPC are still working out the process/checklist to be used to confirm that the finished shotcrete panels meet contract requirements for location, surface quality, thickness, etc.*

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

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

#238 – This risk is that the Quality Program may be ineffective in processing the nonconformance issues causing schedule impacts. The process of tracking and processing the Non-conformance Reports (NCRs) through improved tracking logs is continuing. *TPC has assigned a new QM, which could increase this risk, depending on the individual's effectiveness in implementing the Quality Program.*

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

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

#99 – Risk that a breakdown in the relationship between SFMTA and the contractor results in increased claims and schedule delays. Executive management meetings between SFMTA and the contractor are held on a weekly basis. Executive management attends the weekly work package progress meetings to help identify and resolve key issues. This risk is closely related to #205 below.

#204 – Risk that AT&T cutover work will be completed late and delay at-grade work in 4th Street. *The relocation of AT&T and its tenants' lines was delayed to May 3. Demolition started after that date, approximately two weeks late.*

#205 – The risk that the prolonged process for approval and execution of CMods results in bad blood between SFMTA and the contractor. CMods are now being processed more quickly and the backlog of unresolved changes is being reduced. *TPC has been insisting on lump sum pricing for all CMods and has been inflexible in price negotiations, expressing "take it or leave it" attitude. This development indicates a deterioration of the relationship. SFMTA will issue unilateral contract modifications or directives for work to continue on force account as required to keep the work on schedule. There is an increasing risk of major disputes that would need to be resolved over the long term.*

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

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

#48 – Groundwater at CTS is not completely drawn down, resulting in water intrusion into the excavation. SFMTA is reviewing the data from available instruments and determining if further instrumentation may be needed. There is a concern that there may be insufficient pumping capacity to sufficiently draw down the groundwater.

100 – Delay in delivery of long-lead items results in schedule delays. Meetings started in January 2016 to track the delivery of long-lead items. Current issues involve the dimensions of elevators and escalators relative to the openings available to accommodate the equipment. Two of the machines at YBM appear to be problematic. Management is focused on solving the issues so that the equipment can be ordered.

#246 – Design changes are not captured in as-built record information. This risk is heightened by the recent practice of using responses to RFIs as the vehicle for initiating changes to the design. SFMTA will not allow REs to issue RFI responses that include changes to the design without an accompanying PCC.

APPENDIX E. ROADMAP TO REVENUE OPERATIONS

Roadmap to Revenue Operations - Central Subway Project, San Francisco Municipal Transportation Agency – DRAFT				
Description	Estimated Start Date	Estimated Completion Date	Actual Completion Date	Notes
Testing				
Finalize/update Systems Integration Test (SIT) Plan	TBD	TBD	TBD	Project is in construction, with RSD 2+ years in the future.
Prepare Schedule for Testing	TBD	TBD	TBD	Project is in construction, with RSD 2+ years in the future.
Finalize Test Procedures	TBD	TBD	TBD	Project is in construction, with RSD 2+ years in the future.
Conduct System Integrated Testing with trains, including procedures and reports	TBD	TBD	TBD	Project is in construction, with RSD 2+ years in the future.
Complete Testing Reports	TBD	TBD	TBD	Project is in construction, with RSD 2+ years in the future.
Operating Plan, Rules, and Training				
Finalize Operating Plan	TBD	TBD	TBD	Project is in construction, with RSD 2+ years in the future.
Finalize / revise SOPs, manuals, and rulebook as applicable	TBD	TBD	TBD	Project is in construction, with RSD 2+ years in the future.
Operations Manuals	TBD	TBD	TBD	Project is in construction, with RSD 2+ years in the future.
Staffing and Operations Plan	TBD	TBD	TBD	Project is in construction, with RSD 2+ years in the future.
Training of O&M personnel	TBD	TBD	TBD	Project is in construction, with RSD 2+ years in the future.
Emergency response plan, training, and drills	TBD	TBD	TBD	Project is in construction, with RSD 2+ years in the future.
Vehicle Maintenance Plan, Equipment, Facilities, and Training				
Rail Fleet Management Plan	TBD	TBD	TBD	
Maintenance Schedules and Procedures	TBD	TBD	TBD	<i>The LRV fleet is being replaced and expanded through a</i>

Roadmap to Revenue Operations - Central Subway Project, San Francisco Municipal Transportation Agency – DRAFT				
Description	Estimated Start Date	Estimated Completion Date	Actual Completion Date	Notes
				<i>separate project. The CSP requires an expansion of the fleet of four vehicles.</i>
Spare Parts Requirements	TBD	TBD	TBD	<i>The LRV fleet is being replaced and expanded through a separate project. The CSP requires an expansion of the fleet of four vehicles.</i>
Maintenance Manuals	TBD	TBD	TBD	<i>The LRV fleet is being replaced and expanded through a separate project. The CSP requires an expansion of the fleet of four vehicles.</i>
Maintenance Training	TBD	TBD	TBD	<i>The LRV fleet is being replaced and expanded through a separate project. The CSP requires an expansion of the fleet of four vehicles.</i>
<i>Facility and Right-of-way Maintenance Plan, Equipment, Facilities, and Training</i>				
Maintenance Schedules and Procedures	TBD	TBD	TBD	Project is in construction, with RSD 2+ years in the future.
Spare Parts Requirements	TBD	TBD	TBD	Project is in construction, with RSD 2+ years in the future.
Maintenance Manuals	TBD	TBD	TBD	Project is in construction, with RSD 2+ years in the future.
Maintenance Training	TBD	TBD	TBD	Project is in construction, with RSD 2+ years in the future.
<i>Pre-Revenue Operations</i>				
Finalize and/or update Rail Activation Plan (RAP) and/or Pre-Revenue Operations Plan	4/2/2015	TBD	TBD	Initial draft, including task identification complete. Schedule for updating and completing task descriptions TBD.
Implement Rail Activation Committee	TBD	TBD	TBD	Project is in construction, with RSD 2+ years in the future.
Shadow operations	TBD	TBD	TBD	Project is in construction, with RSD 2+ years in the future.
Develop / revise SSPP & Security Plan (approved by SSO)	TBD	TBD	TBD	Project is in construction, with RSD 2+ years in the future.

Roadmap to Revenue Operations - Central Subway Project, San Francisco Municipal Transportation Agency – DRAFT				
Description	Estimated Start Date	Estimated Completion Date	Actual Completion Date	Notes
FTA Office of Safety & Security Readiness Review	TBD	TBD	TBD	Project is in construction, with RSD 2+ years in the future.
PMOC OP-54 Readiness for Revenue Operations Review Report, Phase I	TBD	TBD	TBD	Project is in construction, with RSD 2+ years in the future.
Conduct Operational Hazard Analysis (OHA) and resolve other hazards / vulnerabilities	TBD	TBD	TBD	Project is in construction, with RSD 2+ years in the future.
Pre-Revenue Operations	TBD	TBD	TBD	Project is in construction, with RSD 2+ years in the future.

Roadmap to Revenue Operations - Central Subway Project, San Francisco Municipal Transportation Agency – DRAFT				
Description	Estimated Start Date	Estimated Completion Date	Actual Completion Date	Notes
Public Outreach				
Develop Safety Outreach Plan	TBD	TBD	TBD	Project is in construction, with RSD 2+ years in the future.
Provide Community Outreach	TBD	TBD	TBD	Project is in construction, with RSD 2+ years in the future.
Grand Opening Plan	TBD	TBD	TBD	Project is in construction, with RSD 2+ years in the future.
Construction Close Out				
Close Out of Non-Conformance Reports	Ongoing	3/7/2019	TBD	NCRs are tracked and closed prior to follow-on work. Final closure of NCRs expected as of final completion date of 1300 Contract.
Punch List Complete	12/17/2018	3/7/2019	TBD	Punch list completion expected at final completion of 1300 Contract.
Certificates of Occupancy / Substantial Completion	TBD	3/7/2019	TBD	
Safety, Security, and Fire-life Safety Certifications				
Update/Finalize SSMP			2/18/2014	Revision 2 completed.
Finalize and/or update SCIL and SSCP			10/10/2008	Revision 0.
Implement Safety and Security Certification Committee			8/1/2010	Committee meets monthly to review certifiable items.
Implement Fire Life Safety Committee			8/1/2010	
Preliminary Hazard Analysis (PHA)				Need dates.
Threat and Vulnerability Analysis (TVA)				Need dates.
Design Criteria Reflecting Safety and Security Requirements				Need dates.
Review status of quality non-conformances	Ongoing	3/7/2019	TBD	
Close Out of non-safety critical items	Ongoing	Ongoing	TBD	

Roadmap to Revenue Operations - Central Subway Project, San Francisco Municipal Transportation Agency – DRAFT				
Description	Estimated Start Date	Estimated Completion Date	Actual Completion Date	Notes
Close Out of safety critical items	Ongoing	Ongoing	TBD	
Complete Safety & Security Certification Verification Report (SSCVR)	TBD	1/7/2019		60 days before RSD - Check against latest regulations.
Document Workarounds / Open Items List	TBD	TBD	TBD	
Verify emergency drills, tabletops, training, etc. are completed	TBD	TBD	TBD	
State Safety Oversight (SSO) final certification / signature	TBD	2/14/2019		21 days before RSD - Check against latest regulations.
<i>Third Party and Agency Agreements</i>				
Third Party/Agency Agreements Necessary for Revenue Service	TBD	TBD	TBD	Project is in construction, with RSD 2+ years in the future.
Third Party/Agency Approvals Necessary for Revenue Service	TBD	TBD	TBD	Project is in construction, with RSD 2+ years in the future.
<i>Revenue Service</i>				
Target Revenue Service Date	-	5/29/2019		Current forecast RSD. Recovery schedule to be prepared.
FFGA Revenue Service Date	-	12/31/2018		

APPENDIX F. LESSONS LEARNED

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

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

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

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

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

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

APPENDIX G. CONTRACT STATUS

The following sections provide the status of ongoing contracts associated with the CSP. Note that the DBE participation percentages are updated by SFMTA on a quarterly basis. The current values are through *March 2016*.

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

Contract No.	1251	
Contract Description:	UR #2 (UMS)	
Status:	Work is complete.	
Cost:	Original Contract Value	\$16,832,550
	Approved Change Orders	\$3,962,031
	Current Contract Value	\$20,794,581
	Expended to Date	\$20,794,581
	% Expended	100%
	SBE Participation	87%
Schedule:	NTP issued January 2011. Substantial completion in August 2012.	
Issues or Concerns:	Final total cost claim by contractor has not been resolved.	

Contract No.	1252	
Contract Description:	Tunnels	
Status:	<i>Final completion achieved. Financial close out underway.</i>	
Cost:	Original Contract Value	\$233.58 million
	Approved Change Orders	<i>\$8.08 million</i>
	Current Contract Value	<i>\$241.67 million</i>
	Expended to Date	<i>\$233.70 million; \$6.2 million is paid from non-project funds</i>
	% Expended	<i>96.7%</i>
	SBE Participation	<i>5.8%</i>
Schedule:	Final completion achieved May 15, 2015.	
Issues or Concerns:	None.	

Contract No.	1277	
Contract Description:	Pagoda Palace Demolition	
Status:	<i>Construction is complete; contract is in close out.</i>	
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:	<i>Support of excavation work is complete. Placement of roof slabs is underway. Preparations underway for mass excavation.</i>	
Cost:	Original Contract Value	\$839.68 million
	Approved Change Orders	\$2.93 million
	Current Contract Value	\$842.61 million
	Expended to Date	\$362.88 million
	% Expended	43.1%
	SBE Participation	20.1%
Schedule:	NTP issued June 17, 2013. Substantial Completion planned February 10, 2018 and forecast December 2018.	
Issues or Concerns:	The work on this contract is behind schedule.	

Contract No.	CS-155-1	
Contract Description:	Design Package 1 for Contracts 1250, 1251, and 1252. PB/Telemon	
Status:	Design is complete. Construction support is ongoing for Contract 1252.	
Cost:	Original Contract Value	\$5,795,000 (includes exercised options)
	Approved Change Orders	\$2,145,159
	Current Contract Value	\$7,940,159
	Expended to Date	\$7,754,848
	% Expended	97.7%
	SBE Participation	29.6%
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	\$31,436,143
	% Expended	86.1%
	SBE Participation	41.8%
Schedule:		
Issues or Concerns:		

Contract No.	CS-155-3	
Contract Description:	Design Package 3 for STS. HNTB-B&C Prime	
Status:	Design is complete. Construction support of Contract 1300 is underway.	
Cost:	Original Contract Value	\$16,822,238
	Approved Change Orders	\$312,814
	Current Contract Value	\$17,232,252
	Expended to Date	\$24,719,950
	% Expended	141.5%
	SBE Participation	27.6%
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	\$52,936,912
	% Expended	62.2%
	SBE Participation	35.4%
Schedule:		
Issues or Concerns:		

Contract No.	CS 156	
Contract Description:	Project Controls Consultant	
Status:	On-going.	
Cost:	Base Contract Value	\$17,112,873
	Approved Change Orders	\$0
	Current Contract Value	\$17,112,873
	Expended to Date	\$9,018,724
	% Expended	52.7%
	SBE Participation	29.1%
Schedule:		
Issues or Concerns:		