MONTHLY REPORT
June 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 May 2016, the project was 59.64% 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 *and this work is not proceeding due to conflicts with ongoing station construction that is limiting access to the tunnels.* The final contract price is likely to be close to the current contract amount.

The 1300 Contract was 44.3% complete on the basis of incurred cost at the end of May 2016. Substantial completion was originally scheduled for February 2018, *but the latest contractor schedule update forecasts 360 calendar days of delay, with substantial completion on February 5, 2019. The contractor's recent schedule updates have been rejected and the master schedule information for the project is based on SFMTA's latest update of the construction schedule, which was completed in May 2016.* SFMTA's version of the schedule indicates substantial completion of the 1300 Contract on January 2, 2019. **The Project Management Oversight Contractor (PMOC) remains concerned that the 1300 contractor is unable or unwilling to deliver an acceptable construction schedule update to SFMTA *and that construction continues to fall further behind schedule as time is passing.***

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 *June 14, 2019, approaching six months later than the date required in the FFGA and nine days later than*

forecast in the April 2016 schedule update. The entire schedule contingency in the program master schedule has now been consumed by the delays to the station construction, and the project schedule has negative float. SFMTA and the contractor have established updated goals for completion of construction milestones for each of the work packages. *The milestone set for CTS construction (completion of the cross-cut cavern from the headhouse to above the station platforms) would have resulted in a reduction of the overall delay to completion of that work package of about two weeks. Since work at CTS is on the critical path for the RSD, SFMTA believed that the time saving could have resulted in a day-for-day recovery of some of the forecast delay to the RSD. However, this milestone will not be achieved due to a late start and lower than planned productivity during the early stages of the work. The completion of the cross-cut cavern will extend into August, meaning that the milestone date will be missed by at least three weeks. Additionally, the PMOC's evaluation of the program schedule indicates that there are four lines (sequences) of work that are driving the RSD. Time savings will need to be identified for all four lines of work to bring the RSD earlier. The specific lines of work and possible schedule compression strategies are documented in the PMOC's draft spot report for the schedule workshops held in late June, which is under review.* **In the opinion of the PMOC, setting of milestone targets has yet to result in recovery of previous schedule delays*, and it appears that some of the latest set of targets will not be achieved. Attention to effective completion of the on-going work is important to reverse the trend of increasing delays over time but it is not sufficient to recover the accumulated delays. More attention should be given to planning the sequences of work that will allow building systems and transit systems testing to start and to the detailed testing and commissioning tasks to determine if it is possible to partially recover the accumulated delays to the project. The testing and commissioning will require support from SFMTA's Transit division, which should be engaged in the planning for this work as soon as possible.***

In the opinion of the PMOC, additional delays to ongoing work will make it very difficult to improve on the current forecast for the RSD and, as a result, the PMOC will continue to focus its oversight efforts on the status of ongoing construction as well as SFMTA's efforts to make changes in the work sequence to save time for work scheduled to occur toward the end of the project.

Table 1 - Core Accountability Items

Project Status: *(as of May 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

Project Status: *(as of May 31, 2016)*		**Original at FFGA:**	**Current Estimate:**
	Total Contingency (Allocated Plus Unallocated, Including Approved Contract Changes)	$185,500,000	*$79,638,257 (down $438,000 from April 2016)*
Schedule	Revenue Service Date	12/26/2018	*06/14/2019* (forecast)

Total Project Percent Complete	Based on Expenditures	*59.64%*
	Based on Earned Value	*60.01%*

Major Issues	**Status**	**Comments/Planned Action**
Schedule Contingency	Based on the latest program master schedule, there is negative schedule float of more than 5 months.	The minimum schedule contingency agreed to at this stage of the project is 6.0 months. *The PMOC convened a schedule containment workshop in June. Several potential schedule recovery strategies were identified and are under evaluation by SFMTA.*
Cost Contingency	The current Total Contingency is *$79.6* 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 at increased project cost, while maintaining the overall program budget.
Technical Capacity and Capability	All management positions in the organization are filled.	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:		*August 4, 2016*

Earned Value (EV): *$947,153,898, an increase of $11.22 million from April.*

Planned Value: *$1,212,596,433, an increase of $15.85 million from April.*

Actual Cost: *$941,290,172, an increase of $11.35 million from April*.

Cost Performance Index (CPI): *1.01*. A value greater than 1 means that value of the work completed is more than the cost of the work (under budget) and less than 1 means that the value of the work is less than the cost of the work (over budget).

Schedule Performance Index (SPI): *0.78*. 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.

Contingency

Cost Contingency

The total available contingency (approved contingency less approved contract changes) is $79,638,257, which is above the minimum required contingency of $60 million and down slightly from April. Unallocated contingency remains at $24.7 million, unchanged from April. **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 or increased costs associated with efforts to accelerate the work to recover delays. 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 *more than 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 current program master schedule indicates that the RSD will be more than five months later than planned unless the duration of future activities can be reduced or more work can be accomplished concurrently. 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 schedule recovery strategies.

The PMOC facilitated a schedule recovery workshop for the project to assist SFMTA in identifying the most promising strategies for reducing the duration of the remaining construction and testing, commissioning and training work and to assess how much of the accumulated delays can be expected to be recovered. In addition, the time savings impacts of the most recent short term schedule performance milestones were assessed. The projected impact to the RSD of the milestones was very limited, and it appears that the key milestone for CTS, which is on the project critical path, will be missed by a number of weeks. In the opinion of the PMOC, although setting and working toward the short term milestones may be encouraging cooperation and collaboration between Tutor Perini Corporation (TPC) and SFMTA in advancing the current

work, this practice has not and most likely will not result in overall time savings or any improvement in the RSD for the project.

While SFMTA has been focusing on the schedule for work at CTS, which is on the current critical path, recovering nearly six months of delay will require that time savings be identified for all of the lines of work that are driving the RSD, including STS work in the tunnels and work at UMS. A more comprehensive view of the lines of work that are driving the RSD must be taken by SFMTA and efforts must be made to improve the work sequence and advance elements of the building systems and transit systems testing and commissioning activities near the end of the project in order to improve the RSD. SFMTA should engage its Transit division in planning for the testing and commissioning work as soon as possible.

Several strategies for saving time on work in each of the critical lines near the end of the project were identified during the workshop. In the opinion of the PMOC, SFMTA should evaluate these strategies and begin working with the contractor to implement those that appear feasible. Even if these strategies are determined to be feasible, it is unlikely that the project can achieve sufficient time savings to recover from all of the accumulated delays and meet the required RSD of December 2018. It was agreed that SFMTA would provide FTA with a range of possible RSD outcomes based on its evaluation of the schedule recovery strategies.

Based on the latest information from the SFMTA's contract change and trend 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 in the Trend Summary dated July 6, 2016 total almost $28.3 million, which is substantially higher than the $20 million allocated contingency for the contract.* Note that this value is higher than the amount reported in Tables 2 and 3, which is based on the SFMTA May CSP Progress Report. There is an additional $4.6 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 excavated by tunnel boring machines and construction of 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 and this work is not proceeding.

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 exceptionally good.

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 May 2016, the construction of the Stations and Surface, Track, and Systems contract was 44.3% complete on the basis of cost and 46.2% complete based on the value of completed construction.

Union Square/Market Street Station (UMS): The current 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 repair of 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. *Preparations are underway beneath the roof deck of the Ellis Street Annex to pour the invert*

slab, which is scheduled to occur on July 22. Under the south concourse deck, the contractor now plans to pour the mud slab that will form the bottom of the invert slab on July 18. The piles forming the walls of the south concourse are being chipped and cleaned in preparation for installation of drainage facilities and the interior walls. At the station box, compensation grouting is scheduled to be completed July 15. Work on the 3rd phase of the roof deck at the O'Farrell intersection was completed in June, and the final phase of the deck is underway with a completion date of July 31. Jet grouting has been completed, and the grout rigs have been demobilized. At the north concourse, the excavation has been backfilled and the area was being readied for restoration of Stockton Street, which is scheduled to be completed on July 22. Under the deck, the concourse level struts and walers were completed and vertical drain pipes are being installed. At Union Square Garage, the plaza level deck is nearing completion and foundation work continues at the Geary Street wall of the garage.

Chinatown Station (CTS): The established schedule performance goal for CTS is to complete the cross-cut cavern by July 12. *The contractor is behind schedule to achieve this milestone, but is working weekends and advancing work in the headhouse while the cross-cut cavern excavation proceeds. The current four-week look-ahead schedule for CTS indicates that this work will extend into August, implying that the milestone achievement will be three to four weeks late. Thus far, the excavation has gone well from a safety standpoint, with no ground movement being detected. The contractor is continuing the installation of level 5 struts and walers in the headhouse during July and is scheduled to complete excavation of the north access shaft in July. Construction of the tunnel connecting this shaft to the station platforms will commence in late July.* ***In the opinion of the PMOC, the latest schedule performance goal for CTS will not be achieved and the hoped-for time savings on the critical path will not be realized.***

Yerba Buena/Moscone Station (YBM): The latest schedule performance milestone for this work package is to place the invert slab of the station box by September 15, 2016. The SFMTA Resident Engineer (RE) for the work package stated that work is on track to meet or exceed this goal, *but the decision to delay the removal of the tunnel liner segments in the station area to allow work on the tunnel invert north of YBM to continue may cause this target to be missed.*

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. The work is proceeding well and all of the water pipe and sewer force main work should be completed by July 22. Excavation of the headhouse has reached the invert level, and the final walers for the invert level were set at the end of June. Struts are being delivered and placed in early July. In the station box, the contractor continues to work on equipment pads and rooms on the mezzanine level. The first stairs will be delivered and installed in early July. The concourse level deck has been poured, and the temporary struts and walers were removed. The contractor is laying out grid lines on the concourse deck for later construction of equipment pads and rooms. The finish course of shotcrete for the station walls above the concourse level will be placed on August 4. The contractor is continuing to delay removal of the tunnel liner segments in the station area through

the month of July to allow placement of the tunnel invert slab and drainage between YBM and UMS to continue.

Surface, Track, and Systems (STS): Two updated schedule performance targets were established for this work package: a) complete all utility work by the end of 2016 and b) start work on special trackwork at Bluxome Street in September 2016. 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, but AT&T did not start demolition and removal of the abandoned duct bank. SFMTA directed TPC to start the removal to avoid further delays to the follow-on work, *and the duct bank removal work by TPC is continuing through at least mid-July while AT&T attempts to engage its own contractor to complete the work.* The cost of this work will be charged to AT&T and should not impact the project budget. *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. This work is tentatively scheduled to start July 25, pending execution of a change order for this work. Placement of the tunnel invert slabs between CTS and UMS was underway. The southbound tunnel is scheduled to be completed July 19, after which work will shift to the tunnel section between UMS and YBM. The track invert in the northbound tunnel between CTS and UMS was scheduled to be completed on July 25, followed by a transition of the work to the UMS-YBM section of this tunnel.* **In the opinion of the PMOC, progress is being made to resolve the numerous utility conflicts that must be addressed before the trackway construction in the at-grade section of the project can proceed. Setting a target date for the completion of all utility work is a positive step.**

Despite the focused attention of the CSP's senior management team on achievement of the short term performance milestones, the critical milestone at CTS will not be achieved and there has been no evidence of recovery of the construction schedule from accumulated delays. As discussed in the Schedule section of this report, time savings must be identified for all four lines of work that are driving the current RSD in order to improve on the current forecast of June 2019.

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 approved by BART, and safety training for the staff members who will do the work is required. *The currently scheduled safety training classes do not have space for the 1252 contract staff and the removal work is being delayed as a result.*

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). The FLSC has 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. CPUC has provided the permits but they will need to be extended as the permits call for the crossings to be in operation before the scheduled completion of the CSP project.

San Francisco Public Utilities Commission (SFPUC)

No updates to report.

San Francisco Department of Public Works (SFDPW)

No updates to report.

San Francisco Parks and Recreation Department

No updates to report.

Private Property Owners

All real estate acquisitions have been completed. There will be a need to extend the duration of some of the licenses for compensation grouting. *A number of private property owners and businesses have issued claims for damage associated with the project construction. These claims should be handled by the contractors' builder's insurance policies, but slow response from the insurance companies has led to the need for City of San Francisco legal staff to become engaged in the effort to resolve the claims. This will impact the project in the form of higher administrative labor costs.*

Status of Vehicle 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 car body structure is complete and the flooring, side cladding, and vehicle front are being installed.*

Real Estate

All project right-of-way has been acquired, and all commercial and residential relocations are complete.

Labor Relations and Policies

Appendix G of the Project Monthly Report details the Small Business Enterprise (SBE) goals and actual participation on each contract as of March 31, 2016. 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 reviewed this report during May 2016 and concluded that SFMTA continues to conduct monitoring activities adequate to confirm that mitigation efforts meet the requirements of the Environmental Impact Statement for the project.**

Real Estate Acquisition Management Plan (RAMP)

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

The latest version of the PMP is dated April 1, 2016. The PMOC's review of the PMP identified minor clarifications in team reporting structure to be included in the 2017 update.

Agency Staff

Total project staff levels are close to the planned values. The Deputy Program Director – Project Services has returned from leave. SFMTA has closed the CSP construction office at 821 Howard Street. Most of the management staff members have been relocated to 530 Bush Street, where both SFMTA and TPC maintain office space. Construction trailers at each work site now accommodate some of the relocated staff.

Contractor Staff

There have been no significant changes in contractor project management staff.

D. PROJECT COST STATUS

Project Cost Control Systems

SFMTA continued to maintain the Trend Log and logs of Change Order Requests (CORs) and Proposed Contract Changes (PCCs) for Contract 1300 using Contract Management 13 (CM13). The Trend Log includes all potential changes in contract value, including items that, in the opinion of the CSP staff, are not merited and new items for which merit has not been determined. The companion contract change management log includes items that have been determined to have merit and are progressing through negotiations toward a contract modification (CMod). SFMTA is working to improve the timeliness of processing determinations of merit as well as the progression of pending contract changes and completion of CMods by creating summary tables of the numbers of items that are in the various stages of processing. *New changes to the 1300 Contract with a total value of $252,000 were approved in May. A modification to the 1252 Contract of $186,000 was also executed in May.*

Reports showing the status of contract changes are reviewed weekly at the status meetings for each of the work packages in the 1300 Contract. *A total of 26 contract modifications had been executed for the 1300 Contract as of July 6, 2016, with three new CMods executed in early June.*

Project Cost (as of May 31, 2016)

Cost estimate: $1.5783 billion.

Total contingency: *$79.64 million (minimum contingency is $60 million), down $438,000 from April.*

Total net incurred costs: *$941,290,172, an increase of $11.35 million from April (59.64% of the total project budget).*

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

Earned Value (EV): *$947,153,898, an increase of $11.22 million from April.*

Planned Value: *$1,212,596,433, an increase of $15.85 million from April.*

Cost Performance Index (CPI): *1.01.*

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

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

Project Cost Trends

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

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

	1252 – Tunnel	1300 Stations, STS
Original Contract	233,584,015	839,676,400
Approved Contingency	2,329,485	19,925,000
Extra Budget for Non-Project Costs	6,173,508	
Approved Budget	235,913,500	859,601,400
Approved Changes	*1,829,687*	*3,259,675*
Current Contract (1252 does not include non-project costs)	*235,413,702*	*842,936,075*
Remaining Contingency	*499,798*	*16,665,325*
Potential Changes (Trends)	170,654	*23,290,934*
Estimate at Completion	*235,584,356*	*866,227,009*

	1252 – Tunnel	1300 Stations, STS
Contingency Less Trends	*329,144*	*(6,625,609)*
Spent to Date	234,881,397	*380,788,767*
Potential Left to Spend	*702,959*	*485,438,242*
Contingency Less Trends as % of Potential Cost to Complete	*46.8%*	*-1.4%*

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

The remaining contingency, less identified trends, represents about 47% 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 -$5,136,465, down from April by almost $6 million.* **In the opinion of the PMOC, the allocated contingency for the 1252 Contract 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 Project

Standard Cost Category (SCC)	Description	Budget Authority (FFGA) $	Approved Current Budget	Contingency	TOTAL Approved Budget	Expenditures $	Expenditures % of FFGA	Remaining FFGA Budget	Committed Contract Amt.	Committed Change Orders	Trends/risks	Estimate to Complete	Estimate at Completion	FFGA Budget Forecast Variance
10	**GUIDEWAY & TRACK ELEMENTS**	$ 315,926,081		$ -	$ 285,696,893	$ 190,776,255	60%	$ 125,149,826		$ -	$ -	$ -	$ -	$ -
10.02	Guideway: At Grade, Semi-exclusive	$ 2,395,143		$ -	$ 2,860,000	$ 145,000	6%	$ 2,250,143						
10.06	Guideway: Underground cut and cover	$ 74,407,195		$ -	$ 70,833,126	$ 61,893,296	83%	$ 12,513,899		$ -				
10.07	Guideway: Underground tunnel	$ 224,933,257			$ 200,793,041	$ 123,512,488	55%	$ 101,420,769						
10.09	Track: Direct fixation	$ 7,293,157			$ 6,761,089	$ 2,606,871	36%	$ 4,686,286						
10.10	Track: Embedded	$ 1,601,763			$ -	$ -	0%	$ 1,601,763						
10.12	Track: Special	$ 5,295,566			$ 4,449,637	$ 2,618,600	49%	$ 2,676,966						
20	**STATIONS, STOPS, TERMINALS,**	$ 432,698,735		$ -	$ 573,714,346	$ 283,946,376	66%	$ 148,752,359		$ -	$ -	$		$ -
20.01	At-grade station	$ 774,913		$ -	$ 6,673,138	$ 1,419,168	183%	$ (644,255)		$ -				
20.02	Aerial station, stop, shelter, mall, terminal, platform	$ -			$ 3,536,045	$ -	#DIV/0!	$ -						
20.03	Underground station	$ 412,084,888			$ 541,803,326	$ 279,184,215	68%	$ 132,900,673						
20.07	Elevators, escalators	$ 19,838,934			$ 21,701,837	$ 3,342,993	17%	$ 16,495,941						
40	**SITEWORK & SPECIAL CONDITIONS**	$ 232,551,627		$ -	$ 206,131,166	$ 182,666,239	79%	$ 49,885,388		$			$ -	$ -
40.01	Demolition, clearing, earthwork	$ 8,887,028			$ 11,228,751	$ 10,501,373	118%	$ (1,614,345)		$				
40.02	Site utilities, utility relocation	$ 29,562,587			$ 56,827,937	$ 56,357,952	191%	$ (26,795,365)						
40.03	Haz. Material, contam'd soli removal, ground water	$ 2,957,442			$ 7,301,393	$ 3,878,001	131%	$ (920,559)						
40.04	Environmental mitigation	$ 3,146,216			$ 1,020,165	$ 589,332	19%	$ 2,556,884						
40.05	Site structures, including retaining walls, sound walls	$ 2,894,074			$ 2,706,431	$ 2,706,431	94%	$ 187,643						
40.06	Pedestrian and bike access and accommodation,	$ 14,393,910			$ 9,755,506	$ 2,177,348	15%	$ 12,216,562		-				
40.07	Automobile, van, bus accessways, including roads	$ 11,919,550			$ 6,967,874	$ 2,133,265	18%	$ 9,786,285		-				
40.08	Temporary facilities and other construction indirect	$ 158,790,820			$ 110,323,109	$ 104,322,537	66%	$ 54,468,283		$ -				
50	**SYSTEMS**	$ 108,429,774		$ -	$ 95,371,098	$ 18,124,143	17%	$ 90,305,631		$ -	$ -	$ -	$ -	$ -
50.01	Train control and signals	$ 37,447,116			$ 28,031,423	$ 6,080,403	16%	$ 31,366,713						
50.02	Traffic signals and crossing protection	$ 3,013,232			$ 12,584,529	$ 6,978,200	232%	$ (3,964,968)		$ -				
50.03	Traction power supply	$ 20,379,634			$ 21,487,073	$ 3,863,853	19%	$ 16,515,781						
50.04	Traction power distribution	$ 16,239,951			$ 12,441,113	$ 1,140,183	7%	$ 15,099,768						
50.05	Communications	$ 28,545,305			$ 12,062,374	$ 61,503	0%	$ 28,483,802		$ -				
50.06	Fare collection system and equipment	$ 2,804,536			$ 6,100,000	$ -	0%	$ 2,804,536		$ -				
50.07	Central Control	$ -			$ 2,664,586	$ 1	#DIV/0!	$ (1)						
Construction Subtotal (10-50)		$ 1,089,606,217	$ 1,142,075,792	$ 18,837,711	$ 1,160,913,503	$ 675,513,013	62%	$ 414,093,204	$ 1,130,842,776	$ 11,745,605	$ 23,461,588	$ 490,536,956	$1,166,049,969	$ (76,443,752)
60	**ROW, LAND, EXISTING IMPROVEMENTS**	$ 37,398,029	$ 32,246,321	$ 5,265,478	$ 37,511,799	$ 30,646,006	82%	$ 6,752,023	$ 36,511,799	$ (4,036,559)	$ -	$ 1,600,315	$ 32,246,321	$ 5,151,708
60.01	Purchase or lease of real estate	$ 33,798,029	$ 30,065,810	$ 5,265,478	$ 35,331,288	$ 28,236,576	84%	$ 5,561,453	$ 34,331,288	$ (4,265,478)		$ 1,600,315	$ 29,836,891	$ 3,961,138
60.02	Relocation of existing households and	$ 3,600,000	$ 2,180,511	$ -	$ 2,180,511	$ 2,409,430	67%	$ 1,190,570	$ 2,180,511	$ 228,919		$ -	$ 2,409,430	$ 1,190,570
70	**VEHICLES**	$ 26,385,653	$ 13,309,000	$ 13,076,653	$ 26,385,653	$ 2,147,952	8%	$ 24,237,701	$ 13,309,000	$ -	$ -	$ 11,161,048	$ 13,309,000	$ 13,076,653
70.01	Light Rail Vehicles	$ 26,385,653	$ 13,309,000	$ 13,076,653	$ 26,385,653	$ 2,147,952	8%	$ 24,237,701	$ 13,309,000	$ -		$ 11,161,048	$ 13,309,000	$ 13,076,653
80	**PROFESSIONAL SERVICES**	$ 361,568,360	$ 310,518,041	$ 18,221,079	$ 328,739,120	$ 232,983,202	64%	$ 128,585,158	$ 328,739,120	$ -	$ -	$ 77,793,448	$ 310,518,041	$ 51,050,319
80.01	Preliminary Engineering	$ 46,317,094	$ 46,202,674	$ -	$ 46,202,674	$ 46,202,675	100%	$ 114,419	$ 46,202,674	$ -		$ -	$ 46,202,674	$ 114,420
80.02	Final Design	$ 86,053,240	$ 61,318,331	$ -	$ 61,318,331	$ 61,576,939	72%	$ 24,476,301	$ 61,318,331	$ -		$ -	*$ 61,318,331*	$ 24,734,909
80.03	Project Management for Design and Construction	$ 191,025,800	$ 89,021,634	$ 13,905,845	$ 102,927,479	$ 61,386,315	32%	$ 129,639,485	$ 102,927,479	$ -		$ 27,635,319	$ 89,021,634	$ 102,004,166
80.04	Construction Administration & Management	$ 15,495,521	$ 91,037,791	$ 2,956,812	$ 93,994,603	$ 51,511,080	332%	$ (36,015,559)	$ 93,994,603	$ -		$ 39,526,711	$ 91,037,791	$ (75,542,270)
80.05	Professional Liability and other Non- Construction	$ 6,800,000	$ 6,800,000	$ -	$ 6,800,000	$ 6,340,196	93%	$ 459,804	$ 6,800,000	$ -		$ 459,804	$ 6,800,000	$ -
80.06	Legal; Permits; Review Fees by other agencies, cities,	$ 7,242,340	$ 8,262,604	$ -	$ 8,262,604	$ 4,573,622	63%	$ 2,668,718	$ 8,262,604	$ -		$ 3,688,982	$ 8,262,604	$ (1,020,264)
80.07	Surveys, Testing, Investigation, Inspection	$ 234,036	$ 883,100	$ -	$ 883,100	$ 13,831	6%	$ 220,205	$ 883,100	$ -		$ 869,269	$ 883,100	$ (649,064)
80.08	Start up	$ 8,400,329	$ 6,991,907	$ 1,358,422	$ 8,350,329	$ 1,378,544	16%	$ 7,021,785	$ 8,350,329	$ -		$ 5,613,363	$ 6,991,907	$ 1,408,422
Subtotal (10-80)		$ 1,514,958,259	$ 1,498,149,154	$ 55,400,921	$ 1,553,550,075	$ 941,290,173	62%	$ 573,668,086	$ 1,509,402,695	$ 7,709,046	$ 23,461,588	$ 581,091,767	$1,522,123,331	$ (7,165,072)
90	**UNALLOCATED CONTINGENCY**	$ 63,341,742		$ 24,749,926	$ 24,749,926	$ -	0%	$ 63,341,742	$ -	$ -	$ -	$ -	$ -	
Subtotal (10-90)		$ 1,578,300,001	$ 1,498,149,154	$ 80,150,847	$ 1,578,300,001	$ 941,290,173	60%	$ 637,009,828	$ 1,509,402,695	$ 7,709,046	$ 23,461,588	$ 581,091,767	$1,522,123,331	$ 56,176,670
100	**FINANCE CHARGES**	$ -			$ -	$ -		$ -	$ -	$ -		$ -	$ -	$ -
TOTAL PROJECT COST (10-100)		$ 1,578,300,001	$ 1,498,149,154	$ 80,150,847	$ 1,578,300,001	$ 941,290,173	60%	$ 637,009,828	$ 1,509,402,695	$ 7,709,046	$ 23,461,588	$ 581,091,767	$1,522,123,331	$ 56,176,670

SCC Breakdown of Forecast Construction Costs Not Available

Change Order Control

SFMTA continues to estimate 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 slightly with the execution of a minor change order to the contract.* 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 Summary" and is dated July 6, 2016. This report shows that 26 contract modifications have been approved (no change from June) for a net increase in the contract value of $3,259,676, representing a small increase since May 31. 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 $28,299,477 in increased contract value, an increase of $2.80 million since early June. An additional 359 items are being tracked in the Trend Log with a net value of $14.02 million in possible contract value increases. Of these, 177 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 156 items have been voided and are carried at no cost. There are 11 notices of potential claims by the contractor, and 15 items are "open" or "new" and awaiting a determination of merit.*

SFMTA reported that TPC continues to insist on lump-sum pricing agreements 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 July 6, 2016 shows a total potential increase in contract cost of $42,324,392, including the $3.25 million in contract cost increases executed thus far. The total estimated cost impact of the identified trends decreased by about $277,000 from June to July. 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. Extra trucking costs for contaminated soil at CTS - $2,274,225

4. Harder rock than anticipated for CTS slurry wall excavation - $2,820,600
5. Delays to installation of tangent piles at UMS - $1,082,380
6. UMS Garage underpinning requirements - *$761,896 (increased from $748,508)*
7. Utility conflicts with 12" water line at UMS - $335,468
8. Utility conflicts with sewer line installation at UMS - $744,465
9. Changes in construction sequence for UMS Garage - $500,000
10. Changes in installation requirements for art glass at UMS - $681,978
11. Obstructions to jet grout placement at UMS - *$1,760,320 (increased from $1,748,070)*
12. Change to Irwin brand switch machines - *$391,909 (increased from $389,965)*
13. Additional instrumentation for detection of ground movement - $429,777
14. Changes to walls of maintenance hatch at Union Square Garage - $339,310
15. Time impacts due to power pole conflict during demolition at CTS - $2,412,252
16. Removal of temporary facilities from 1252 Contract in tunnel - $616,354
17. Additional traffic control requirements at 4th and King - $675,001
18. Changes to AWSS layout at 4th and King - $295,269
19. Contractor-claimed change in contract requirements for pre-loading permanent struts at UMS - $1,853,352
20. Contractor claimed change in contract requirements related to the design loads for permanent struts acting as temporary support - $2,700,001
21. Incomplete design details for conduits between UMS and CTS - $300,001
22. Additional traffic control requirements for STS work package - $1,032,302
23. 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)
24. Changes to utility design at YBM - $627,854
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. Removal of AT&T duct bank in at-grade section - $282,345
28. Additional quantities for CMod 19 at CTS - $300,001
29. Change in vent for emergency generator at all stations - $500,001
30. *Change in jet grout placement in Union Square Garage - $500,001 (new)*
31. *Additional waterproofing and drain under sidewalks at UMS - $254,532 (new)*

32. Change to soil nails and shotcrete from sheet piles at Union Square Garage - $1,164,129
33. Contractor claim that wayside signals are extra - $321,974
34. *Change to grout details and drainage piping at UMS - $250,001 (new)*

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

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

Funding and Expenditures

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

Table 4 - Project Funding

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

E. PROJECT SCHEDULE STATUS

SFMTA prepared a Master Program Schedule update in May representing progress on the project through May 2016. SFMTA reported that it had again rejected the contractor's schedule submittal for May 2016 due to logic problems. However, the schedule logic for future work was deemed to be correct. The PMOC noted that the contractor's most recent schedule update shows 360 calendar days of delay to the substantial completion date, which is substantially more delay than is indicated in SFMTA's master program schedule (312 days). **The PMOC remains concerned that TPC has been unwilling or unable to produce its own acceptable schedule**

update, but notes that progress is being made toward an acceptable contractor schedule. A proper schedule from the contractor should facilitate the evaluation and agreement on schedule recovery strategies and help to resolve disputes regarding the responsibility for past schedule delays.

The May 2016 master program schedule update indicates that the construction work is 10 to 11 months behind schedule, while the contractor's latest schedule indicates about 12 months of delay to the completion of construction. The critical path for the construction work continues to flow through the construction of CTS, *but analysis by the PMOC indicates that there are a total of four lines of work that are influencing the RSD for the project*. The projected RSD forecast is now *June 14, 2019*, nearly six months later than planned *and nine days later than forecast in April due to lower than expected production rates for the early stages of the cross-cut cavern excavation*. 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. As a result of the workshop, an initial proposed action plan for developing the necessary tools 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 May 2016 SFMTA Progress Report for CSP, SFMTA had completed items 1 through 6, but the contractor had yet to accept SFMTA's recommended schedule improvements and had not submitted a schedule update incorporating all of the improvements. SFMTA reported that the contractor understands and generally accepts the schedule requirements. SFMTA had 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. *However, SFMTA rejected the contractor's April and May schedule submittals due to continuing problems with the schedule logic.* 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. The contractor has been working Saturdays and Sundays at CTS and has advanced some work that was indicated to be successor work to the ongoing excavation of the cross-cut cavern. *Despite these efforts by the contractor, the RSD has been slipping by several days each of the past few months, with the overall delay beginning to approach six months.*

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 *and no schedule recovery has been achieved.* Table 5 shows the latest milestones and the current status for each.

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

Milestone	**Target Date**	***Status***
Complete cross-cut cavern at CTS	*July 12, 2016*	*3 to 4 weeks behind*
Install concourse level struts and walers at UMS	September 1, 2016	*On track*
Complete invert slab for station box at YBM	September 15, 2016	*Reported as on track, but decision to delay removal of tunnel liner segments may delay completion*
Complete all utility work *Start special trackwork at Bluxome*	*End of 2016* *September 2016*	*Reported as on track* *Reported as on track*

[4] *SFMTA Management Meeting, 6/6/2016*

The PMOC convened a second schedule workshop for the project on June 22 and 23. The PMOC's analysis of the schedule indicates that four lines of work are driving the RSD:

- *CTS work leading to tunnel electrical power and ATCS testing;*
- *STS work (Radiax, Train Control & Software) leading to ATCS testing;*
- *CTS work leading to building startup and testing;*
- *UMS work leading to building startup and testing.*

Improvements must be made in the overall durations of each of these lines of work in order to move the RSD earlier than the current projection. The workshop identified several strategies for improving the schedule for each line of work. These strategies are now under review by SFMTA. Additionally, the SFMTA scheduling team and the PMOC's scheduling experts reviewed the schedule benefits of the current schedule performance milestones. Due to the fact that multiple lines of work are driving the RSD, the impact of achieving the milestones would be limited. Combined with the fact the many of the milestones have not been achieved, the PMOC's

conclusion is that the practice of setting short term schedule performance targets has not been effective in achieving schedule recovery.

In the opinion of the PMOC, although setting and working toward the short term milestones may be encouraging cooperation and collaboration between TPC and SFMTA in advancing the current work, this practice has not and most likely will not result in overall time savings or any improvement in the RSD for the project. A more comprehensive view of the lines of work that are driving the RSD must be taken by SFMTA and efforts must be made to improve the work sequence and advance elements of the testing and commissioning activities near the end of the project in order to improve the RSD. SMTA should engage its Transit Division in planning the testing and commissioning work as soon as possible, since Transit Division staff will have key roles in these activities.

Project Schedule Data

Earned Value (EV): *$947,153,898, an increase of $11.22 million from April.*

Planned Value: *$ 1,212,596,433, an increase of $15.85 million from April.*

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 is unchanged from the previous reporting period, indicating no recovery of accumulated delays.

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)

	(P = Planned Date, A = Actual Date, F = Forecast Date)
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); *June 14, 2019* (F)

The current master schedule incorporating the approved 1300 Contract baseline schedule and updated actual progress through *May 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 *nearly six months of negative buffer float.*

Critical Path Summary *(Baseline Schedule)*

CTS Install Guidewalls, Slurry Walls, and Install Surface Deck (complete)
CTS Excavate Headhouse and Bracing (complete)
CTS 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 *June 14, 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

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

Start excavation for fan plant to be located under the garage

Start erection of structural steel at north station entrance

Install permanent struts and walers for concourse level of station box

Begin construction of access shaft at O'Farrell Street

Install bracing in the tunnels

Continue compensation grout operations

Complete station roof and restore Stockton Street curb, gutter, sidewalks, and pavement

Install drainage pipes from the roof level to the concourse level in the north concourse

Start installation of station electric power equipment

CTS

Complete excavation of the cross-cut cavern from the headhouse to the station

Start excavation of the northbound and southbound station platform caverns

Complete excavation to level 6 of the headhouse

Provide compensation grouting as needed

YBM

Complete placement of concourse level slab

Excavate to level 6 and install temporary struts and walers

Excavate station box to the platform *(invert)* level

Begin installation of ducts and other sub-invert facilities

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

Continue placement of shotcrete interior walls and construction of rooms and equipment platforms on the mezzanine and concourse levels

STS

Sewer installation and repair

AWSS installation

Muni ductbank installation

Installation of fiber optic cable by AT&T

Start installation of tunnel lighting

Install overhead contact system support poles

Complete placement of tunnel drainage and invert slab from CTS to UMS and start placement between UMS and YBM

Placement of tunnel walkways

The PMOC expects to attend the following meetings:

- Weekly Management (*August 1, September 6 and October 3)*

- Weekly Contract 1300 Construction Progress Meetings (*first Tuesday and Wednesday of August, September, and October*)
- Weekly Configuration Management Board (CMB) (first Wednesday of August, *September and October*)
- Monthly CSP Risk Management Meetings (first Thursday of August, *September, and October)*
- CSP month-end meetings on August 2, *September 6 and October 3*
- 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 Contractor Non-conformance Report (CNCR) Log for identifying, correcting, documenting, and controlling non-conformances is maintained by the contractor and reviewed at weekly status meetings for each work package. Subsequent work may not progress for work that is the subject of a Corrective Action Request (CAR) until conditions adverse to quality are corrected. In the event that the contractor does not issue a CNCR, SFMTA may issue a Notice of Non-conformance (NCN) where non-conforming work is identified by SFMTA's quality assurance staff.

Construction crew attention to quality has been improving, with the occurrence of critical non-conforming work becoming less frequent. The following quality issues and concerns for the 1300 Stations Contract were identified in the SFMTA May monthly report:

- *Contractor advancing work prior to receiving formal approvals for all related submittals*
- Issues with the procedure to confirm that final placements of shotcrete walls and ceilings conform to contract requirements for location and surface quality.

As of May 4, 2016, 190 CNCRs had been filed by TPC's Quality Manager (13 more than in early 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.

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. The performance metrics relating to accidents per working hour are well below the OSHA goals for similar construction. The current accident records for the 1300 Contract are shown in Table 7.

Table 7 - Construction Safety Data

Through April 2016	No. of Incidents	Incident Rate[1]	Goal
1300 Contract			
OSHA Recordable Accidents	*4*	*0.70*	<3.4
Job Transfer/Restricted Duty Incidents	*0*	*0*	NA
Lost Time Incidents	*0*	0	<1.6
Total Incidents	*4*	*0.70*	NA
Hours Worked	*1,137,596*		

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

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 then current status of the construction work and the accumulated construction delays.

The Contract 1300 baseline schedule was adopted in early December 2014. Schedule updates completed by the contractor have been rejected by SFMTA due to logic errors and have not been incorporated into the Master Program Schedule. SFMTA has prepared its own revision of the construction schedule and is using updates to that schedule to maintain the master program schedule. SFMTA is continuing to refine the record of as-built construction activity incorporated in the master 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 most recent Risk Mitigation Meeting attended by the PMOC was the June 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 52 – Excavation of the cross-cut cavern at CTS causes ground settlement and damage to old utilities above the station. Excavation has been proceeding well, with no ground movement detected by the numerous instruments above the station.
- Risk 48 – Incomplete groundwater drawdown results in water intrusion into CTS excavation. Excavation has been proceeding with instrumentation of groundwater indicating that the groundwater is being controlled as intended.

- Risk 232 – Inability to recover from schedule delays results in late RSD. SFMTA and the contractor are focusing on achievement of the schedule target for the cross-cut cavern at CTS. The contractor is working weekends and also is advancing work that was shown as successor work to the cavern excavation.
- Risk 100 – Delays due to procurement issues with long-lead items. Tracking of specific long-lead items was started in January 2016. Elevator and escalator dimensional issues are continuing. SFMTA is evaluating possible issues with maintenance access for the equipment that the contractor has proposed as a substitution. This item continues to have 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 being mitigated by having the contractor demolish and remove the abandoned duct bank while AT&T attempts to procure a contractor to do the work.

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

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

I. ACTION ITEMS

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

Table 8 - SFMTA Action Items for Central Subway Project

Category	NO.	ACTION	DATE OPENED	DUE DATE	DATE CLOSED	COMMENTS
S	**164**	Develop technically acceptable schedule tool in P6	12/10/15	*4/20/2016*	*4/21/2016*	
S	**165**	Develop recovery schedule	12/10/15	*7/31/2016*		SFMTA to work with contractor on recovery strategies. *Workshop conducted on June 22, 23, 2016*
S, RA	**166**	Update schedule risks based on recovery schedule	12/10/15	TBD		Once the schedule tool and recovery schedule are complete

(Note: All closed items are removed a month after being closed. Changes to open items since last update are indicated in *italics*.)

Category Key:

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

APPENDIX A. LIST OF ACRONYMS

APTA	American Public Transportation Association
ARS	Air Replenishment System
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
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
ROD	Record of Decision
RSD	Revenue Service Date
SBE	Small Business Enterprise
SCIL	Safety Certifiable Item List
SCP	Safety Certification Plan
SEIS	Supplemental Environmental Impact Statement
SEM	Sequential Excavation Method
SEPP	Security and Emergency Preparedness Plan
SFDPW	San Francisco Department of Public Works
SFFD	San Francisco Fire Department
SFMTA	San Francisco Municipal Transportation Agency
SFPUC	San Francisco Public Utilities Commission
SIT	Systems Integration Test
SoMa	South of Market (Street)
SOP	Standard Operating Procedure
SPI	Schedule Performance Index

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

APPENDIX B. SAFETY AND SECURITY CHECKLIST

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

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

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

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

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

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

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

N/A = Not applicable.

APPENDIX C. PROJECT MAP AND OVERVIEW

CENTRAL SUBWAY PROJECT: Project Overview and Map

Date:	*July 14, 2015*
Project Name:	Central Subway Project (CSP) New Starts Light Rail Transit
Grantee:	San Francisco Municipal Transportation Agency (SFMTA)
FTA Regional contact:	Mr. Jeffrey S. Davis
FTA Headquarters contact:	Ms. Kim Nguyen

Scope

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

Schedule

07/02	Approval Entry to PE	2016	Estimated Rev Ops at Entry to PE
01/10	Approval Entry to FD	2018	Estimated Rev Ops at Entry to FD
10/11/12	FFGA	2018	Estimated Rev Ops at FFGA
06/14/2019			Revenue Operations Date at date of this report

60.0% *Percent Complete Based on Progress* (*April 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
$941.29 million	Amount of Expenditures at date of this report from Total Project Budget of $1,578 million
59.64%	Percent Complete based on Expenditures at date of this report
$24.75 million	Unallocated Contingency remaining
$79.64 million	Total Project Contingency (allocated and unallocated contingency as reported by CSP)
$60 million	Minimum Total Project Contingency revised on September 5, 2012 PMOC review of Contingency Management Plan

	AT HOLD POINTS	QTR	Minimum Contingency Levels	Revised Levels
1A	Hold Point 1a – Tunnels 100% designed February 2011 (Actual)	1Q11	280	280
1B	Hold Point 1b – CTS 100% designed June 2012 (Actual)	4Q11	250	240
1C	Hold Point 1c – 40% Bid (Tunnel and CTS)	2Q12	225	200
1D	Hold Point 1d – FFGA Award October 2012 (Actual)	3Q12	-	180
2	Hold Point 2 – Commence CTS / UMS construction (Actual June 17, 2013)	2Q13	160	160
3	Hold Point 3 – Demobilize Tunnels *(Actual April 15, 2015)*	*2Q15*	140	140
4	Hold Point 4 – Stations to platform levels (CTS/YBM) November 2016	4Q16	60	60
5	Hold Point 5 – Complete CTS / Tunnels systems inst. April 2018	2Q18	25	25
RSD	PMOC / FTA RSD	4Q18		
CURRENT TOTAL CONTINGENCY *$79.64 Million*				


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

APPENDIX D. TOP PROJECT RISKS

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

Top Risks Discussed in the Previous Month:

#52 – The risk of settlement of older utilities above the CTS cross-cut cavern and platform cavern excavations. The ground above and near the excavation is extensively instrumented and daily meetings are being held to review the recorded data from the instruments. Thus far, no ground movement has been detected. This risk will remain, although it appears to be at a reduced level, until the excavation is completed.

#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 progress at CTS is a few days behind that needed to achieve the target for the cross-cut cavern, but the contractor is working extended shifts to catch up.

#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 shotecrete 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 will continue to be monitored until all SEM operations are completed. Closely related to risk# 52.

#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. The CNCR log is being updated as appropriate. CNCRs are being identified timely and processed appropriately.

#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. The contractor is now producing accurate schedules, but they are late in delivering the schedule information.

#243 – Risk that contractor will be complacent in addressing damage claims from 3rd parties, resulting in additional costs to the program. Extra costs are being incurred as a result of claimants going to the city as opposed to the contractor with damage claims. City is incurring attorney and other administrative costs as a result of the contractor's failure to proactively address the claims.

#104 – Risk that PUC approval of grade crossings will expire prior to completion of construction. CPUC has granted an extension to the date that the permitted crossings must be operable.

#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. AT&T did not immediately begin demolition of the abandoned facilities. To avoid further delays, SFMTA directed TPC to begin demolition and removal pending AT&T securing a contractor to perform this work. Demolition is underway.

#205 – The risk that the prolonged process for approval and execution of CMods results in bad blood between SFMTA and the contractor. CMods are now being processed more quickly and the backlog of unresolved changes is being reduced. SFMTA continues to try and streamline the CMod process. The contractor has expressed appreciation for SFMTA's efforts to clear the backlog of pending CMods.

#245 – Relocation of the SFMTA Project Management Operation results in reduced management effectiveness. This risk was rated and found to be minor. Staff relocations are nearly complete. Some utility connections to the field offices remain to be completed. This risk can likely be retired in July 2016.

#48 – Groundwater at CTS is not completely drawn down, resulting in water intrusion into the excavation. SFMTA is reviewing the data from instruments on a daily basis. Thus far, groundwater pumping rates have been quite low and there is no indication of any potential issues with water intrusion into the excavation for the cross-cut cavern.

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. There is a possible issue with maintainability of the equipment the contractor has proposed.

#244 – Risk of delays due to coordination issues with hotel building construction on the Olivet University site adjacent to YBM. Coordination is ongoing with the hotel now in the vertical construction phase. OSHA identified a need for direct communication between the hotel construction crane operator and crane operators at the YBM site due to the overlapping swings of the equipment.

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	

Roadmap to Revenue Operations - Central Subway Project, San Francisco Municipal Transportation Agency – DRAFT				
Description	**Estimated Start Date**	**Estimated Completion Date**	**Actual Completion Date**	**Notes**
Maintenance Schedules and Procedures	TBD	TBD	TBD	The LRV fleet is being replaced and expanded through a separate project. The CSP requires an expansion of the fleet of four vehicles.
Spare Parts Requirements	TBD	TBD	TBD	The LRV fleet is being replaced and expanded through a separate project. The CSP requires an expansion of the fleet of four vehicles.
Maintenance Manuals	TBD	TBD	TBD	The LRV fleet is being replaced and expanded through a separate project. The CSP requires an expansion of the fleet of four vehicles.
Maintenance Training	TBD	TBD	TBD	The LRV fleet is being replaced and expanded through a separate project. The CSP requires an expansion of the fleet of four vehicles.
Facility and Right-of-way Maintenance Plan, Equipment, Facilities, and Training				
Maintenance Schedules and Procedures	TBD	TBD	TBD	Project is in construction, with RSD 2+ years in the future.
Spare Parts Requirements	TBD	TBD	TBD	Project is in construction, with RSD 2+ years in the future.
Maintenance Manuals	TBD	TBD	TBD	Project is in construction, with RSD 2+ years in the future.
Maintenance Training	TBD	TBD	TBD	Project is in construction, with RSD 2+ years in the future.
Pre-Revenue Operations				
Finalize and/or update 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.

Roadmap to Revenue Operations - Central Subway Project, San Francisco Municipal Transportation Agency – DRAFT				
Description	**Estimated Start Date**	**Estimated Completion Date**	**Actual Completion Date**	**Notes**
Develop / revise SSPP & Security Plan (approved by SSO)	TBD	TBD	TBD	Project is in construction, with RSD 2+ years in the future.
FTA Office of Safety & Security Readiness Review	TBD	TBD	TBD	Project is in construction, with RSD 2+ years in the future.
PMOC OP-54 Readiness for Revenue Operations Review Report, Phase I	TBD	TBD	TBD	Project is in construction, with RSD 2+ years in the future.
Conduct Operational Hazard Analysis (OHA) and resolve other hazards / vulnerabilities	TBD	TBD	TBD	Project is in construction, with RSD 2+ years in the future.
Pre-Revenue Operations	TBD	TBD	TBD	Project is in construction, with RSD 2+ years in the future.
Public Outreach				
Develop Safety Outreach Plan	TBD	TBD	TBD	Project is in construction, with RSD *2+* years in the future.
Provide Community Outreach	TBD	TBD	TBD	Project is in construction, with RSD *2+* years in the future.
Grand Opening Plan	TBD	TBD	TBD	Project is in construction, with RSD *2+* years in the future.
Construction Close Out				
Close Out of Non-Conformance Reports	Ongoing	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.

Roadmap to Revenue Operations - Central Subway Project, San Francisco Municipal Transportation Agency – DRAFT				
Description	**Estimated Start Date**	**Estimated Completion Date**	**Actual Completion Date**	**Notes**
Implement Safety and Security Certification Committee			8/1/2010	Committee meets monthly to review certifiable items.
Implement Fire Life Safety Committee			8/1/2010	
Preliminary Hazard Analysis (PHA)				Need dates.
Threat and Vulnerability Analysis (TVA)				Need dates.
Design Criteria Reflecting Safety and Security Requirements				Need dates.
Review status of quality non-conformances	Ongoing	3/7/2019	TBD	
Close Out of non-safety critical items	Ongoing	Ongoing	TBD	
Close Out of safety critical items	Ongoing	Ongoing	TBD	
Complete Safety & Security Certification Verification Report (SSCVR)	TBD	1/7/2019		60 days before RSD - Check against latest regulations.
Document Workarounds / Open Items List	TBD	TBD	TBD	
Verify emergency drills, tabletops, training, etc. are completed	TBD	TBD	TBD	
State Safety Oversight (SSO) final certification / signature	TBD	2/14/2019		21 days before RSD - Check against latest regulations.
Third Party and Agency Agreements				
Third Party/Agency Agreements Necessary for Revenue Service	TBD	TBD	TBD	Project is in construction, with RSD *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.
Revenue Service				
Target Revenue Service Date	-	*6/05/2019*		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:	*Final completion achieved. Financial close out underway.*	
Cost:	Original Contract Value	$233.58 million
	Approved Change Orders	$8.08 million
	Current Contract Value	$241.67 million
	Expended to Date	$233.70 million; $6.2 million is paid from non-project funds
	% Expended	96.7%
	SBE Participation	5.8%
Schedule:	Final completion achieved May 15, 2015.	
Issues or Concerns:	None.	

Contract No.	**1277**	
Contract Description:	**Pagoda Palace Demolition**	
Status:	*Construction is complete; contract is in close out.*	
Cost:	Original Contract Value	$498,995
	Approved Change Orders	$179,139
	Current Contract Value	$678,134
	Expended to Date	$638,278
	% Expended	94.1%
	SBE Participation	100%
Schedule:		
Issues or Concerns:	None.	

Contract No.	**1300**	
Contract Description:	**Three subway stations (YBM, UMS, and CTS) and STS**	
Status:	*Support of excavation work is complete. Placement of roof slabs is underway. Preparations underway for mass excavation.*	
Cost:	Original Contract Value	$839.68 million
	Approved Change Orders	$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:		