MONTHLY MONITORING REPORT
October 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. Revenue service commenced on the T Third Line in April 2007. The CSP will extend the T Third Line from the 4th Street Caltrain Station to Chinatown, providing a direct, rapid transit link from the Bayshore and Mission Bay areas to South of Market (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) are included in the budget for the CSP as part of a larger procurement that will replace the entire LRV fleet. Average weekday boardings are projected to be 43,521 in 2030.

Project Status

The project has been under construction since February 2010. *At the end of September 2016, the project was 62.72% complete based on expenditures and there was one active construction contract: 1300 Stations and Systems/Trackwork. That contract was 48.06% complete on the basis of incurred cost at the end of September 2016.* Substantial completion was originally scheduled for February 2018, *but the latest master program schedule update forecasts substantial completion on March 5, 2019, a delay of 389 days (15 more days than last month). The contractor's schedule updates continue to be rejected, and the master schedule information for the project is based on SFMTA's latest update of the construction schedule, which indicates a forecast Revenue Service Date (RSD) of August 15, 2019. This is 161 days later than the required RSD in the Full Funding Grant Agreement (FFGA).* **The Project Management Oversight Contractor (PMOC) remains concerned that construction continues to fall further behind schedule as time is passing and that it appears the production rates assumed in the schedule for the underground mining work at CTS cannot be achieved. This mining work is on the critical path, and it appears that further schedule delays are likely to accrue until this mining work is complete.**

SFMTA and the contractor have established goals for completion of construction milestones for each of the work packages. *The previous milestone for critical path work at CTS was missed by more than 12 weeks. A new milestone—completion of the first ring of the platform cavern by March 28, 2016 – has been set for CTS. SFMTA asserts that once this ring is complete, construction can proceed in two directions, offering a potential to improve productivity.* ***In the opinion of the PMOC, any schedule recovery associated with the new CTS schedule milestone goal will be evident late in the second quarter of 2017.***

In the opinion of the PMOC, setting of milestone targets alone will not be sufficient to prevent further delays or to recover the delays that have already occurred. Attention should be given by SFMTA to planning the sequences of work that will allow building systems and transit systems testing to start, and SFMTA should review 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 challenging 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 September 30, 2016)*		**Original at FFGA:**	**Current Estimate:**
Cost	Cost Estimate	$1,578,300,000	$1,578,300,000
Contingency	Unallocated Contingency	$74,722,000	$4,749,924
	Total Contingency (Allocated Plus Unallocated, Including Approved Contract Changes)	$185,500,000	*$79,032,544 (reduced slightly from August 2016)*
Schedule	Revenue Service Date	12/26/2018	*08/15/2019* (forecast)
Total Project Percent Complete	Based on Expenditures	*62.72%*	
	Based on Earned Value	*62.49%*	
Major Issues	**Status**	**Comments/Planned Action**	
Schedule Contingency	Based on the latest program master schedule, there is negative schedule float of *more than 7 months.*	The minimum schedule contingency agreed to at this stage of the project is 6.0 months. The PMOC convened a schedule recovery workshop in June 2016. Several potential schedule recovery strategies were identified and are under evaluation by SFMTA.	
Cost Contingency	*The current Total Contingency is $79.0 million.* The FTA recommends a minimum contingency level of $60 million.	The availability of excess cost contingency may make it possible to implement strategies to accelerate the construction work at an increased project cost, while maintaining the overall program budget.	

Technical Capacity and Capability	All management positions in the organization are filled.	SFMTA has hired an additional experienced forensic scheduler to expedite the development of the as-built schedule and the evaluation of the responsibilities for accumulated delays.
Date of Next Quarterly Meeting:		*February TBD, 2017*

Earned Value (EV): *$986,306,119, an increase of $5.88 million from August.*

Planned Value (PV): *$1,270,901,613, an increase of $15.05 million from August.*

Actual Cost: *$989,957,714, an increase of $12.15 million from August.*

Cost Performance Index (CPI): *1.00*. 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 $79,032,544, which is above the minimum required contingency of $60 million and down about $110,000 from August due to the execution of contract modifications. Unallocated contingency is now $4.75 million, unchanged from August. **In the opinion of the PMOC, the overall available cost contingency remains sufficient to provide reasonable assurance of on-budget completion of the project. Potential contractor claims for delay-related costs are a concern that should be monitored. The previous month's transfer of budget from unallocated contingency to allocated contingency for the stations work is appropriate based on SFMTA's project value of pending contract changes and trends.**

Schedule Contingency

The program master schedule for the CSP now shows negative buffer float and a forecast RSD more than six 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 an increasing risk that the RSD will be missed by several months.***

PMOC Observations, Opinions, and Concerns

The current program master schedule indicates that the RSD will be more than seven months later than planned. The PMOC is concerned that the 1300 contractor has not been able to achieve the planned production rates for critical mining work at CTS, making further delays likely. In the

opinion of the PMOC, although setting and working toward the short term milestones may be intended to encourage 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, recovering more than seven months of delay will require that time savings be identified for all of the lines of work (sequences) that are driving the RSD, including Surface, Track, and Systems (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 systems construction and transit systems testing and commissioning activities near the end of the project in order to improve the RSD.

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, and there is an increasing risk that the RSD will be missed by several months. *In the opinion of the PMOC, the effectiveness of SFMTA's current efforts to improve schedule performance will be evident late in the second quarter of 2017. By this time, much of the original station construction schedule will have been consumed, leaving relatively little time to recover the accumulated delays.*

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 *10.7%* of the potential remaining spending is sufficient to provide reasonable confidence 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. *SFMTA should expeditiously complete its evaluation of the causes of and responsibilities for delays to the 1300 Contract.*

The PMOC notes that progress is being made in resolving the backlog of change order requests by the contractor, with the number of executed contract modifications increasing in the latest quarter. In the opinion of the PMOC, the trend log tracking should include the amount of time that has passed from the initial identification of the trend. The average time taken to resolve trends should also be tracked.

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. The Resident Engineer (RE) for STS demonstrates a clear understanding of the work to be completed, the required sequence, and the third party coordination that must occur to complete the work.

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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 completed contract relocated utilities within the footprint of the proposed Yerba Buena/Moscone Center (YBM) Station. All cost claims by the contractor have been settled.

Contract 1251 (UR #2). This completed contract included the relocation of utility lines within the footprint of the proposed Union Square/Market Street (UMS) Station and temporarily rerouted existing trolley coach lines around the construction zone. There is an outstanding cost claim by the contractor for this contract.

Contract 1252 Tunnel. This completed contract included the construction of 1.5 miles of twin tunnels excavated by tunnel boring machines and construction of the tunnel portal and retrieval shaft. Final completion has been achieved, and financial close out should occur in early 2017. 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 scheduled to be completed once the contractor regains access to the tunnel locations. Instrumentation must be removed from the Bay Area Rapid Transit (BART) tunnels, and the contractor has been working to obtain the required training and to schedule the work with BART.

SFMTA expects that the final cost of the tunnel contract will be within approximately $2 million of the original contract value, representing a cost increase of less than 1 percent, discounting extra scope that is not part of the federal project.

Contract 1300 (Combination of UMS, CTS, YBM, and STS). This contract includes the construction of three underground stations, one surface station, all surface works required for the installation of Light Rail Transit (LRT) between 4th and King streets and the tunnel portal, and all LRT track and systems components. *As of the end of September 2016, the construction of the Stations and Surface, Track, and Systems Contract was 48.06% complete on the basis of cost and 49.05% complete based on the value of completed construction.*

Union Square/Market Street Station (UMS): The latest schedule performance goal for UMS was to install the concourse level (the first level below ground) struts and walers in the station box by September 1, 2016. The final strut was installed on October 12, about 12 weeks later than targeted. *A new goal—placement of the mezzanine level walers and struts by February 14, 2017—has been*

established. The triangle formed by Market Street, the westbound lane of Ellis Street, and the western end of the Ellis Street Annex remained uncovered pending the placement of utilities in their final location prior to backfilling and paving the area.

Work under the deck to place the invert slab in the south concourse area has been completed. At the station box, the outer station walls between the roof deck and concourse were placed using shotcrete. Excavation from the concourse level down to the intermediate strut level was completed, and installation of walers, struts, and other work in preparation for placement of the intermediate level struts was underway, with completion expected on November 18. Work on emergency egress stairs 3 and 4 continued in November.

At the north concourse, the installation of the final utilities above the roof deck was due to be completed in mid-November. Excavation to the invert was completed, and preparations were underway to place the invert slab and the concourse outer walls. At Union Square Garage, work on the plaza level deck, forecast to be completed on October 25, was expected to continue until at least November 8. The base slabs at the bottom of the station entrance were scheduled to be placed on November 21, followed by the start of structural steel erection.

Chinatown Station (CTS): W*ork on the cross-cut cavern was finally completed on October 6, more than 12 weeks later than the original target. The contractor's slow production on Sequential Excavation Method (SEM) mining contributed to a slippage of 15 days on the critical path in September. The contractor completed structural work on the north access shaft and tunnel connecting to the platform cavern in October. All work is now focused on continued SEM mining, which transitioned to the station platform caverns in October. The new schedule goal for CTS is to complete the first ring of the platform cavern by March 28, 2017. Completion of the first ring will allow excavation to proceed in two directions, potentially improving productivity of the mining operation.* **The Project Management Oversight Contractor (PMOC) remains concerned that the assumed production rates for underground mining at CTS have not been achieved. Based on the contractor's performance to date on the mining of the cross-cut cavern, there is a risk that the assumed productions rates on the upcoming mining work will not be achieved.** The current program schedule indicates that approximately one year of mining work remains. **In the opinion of the PMOC, if the assumed production rates for mining of the platform and crossover caverns cannot be achieved, significant additional delay to the substantial completion of the 1300 Contract will accrue.** *SFMTA has stated that a more accurate projection of the project completion date will be possible in the second quarter of 2017, when progress on the remaining SEM work can be evaluated.*

Yerba Buena/Moscone Station (YBM): The latest schedule goal for YBM is to complete the station box invert slab by February 14, 2017.

Traffic remains shifted away from the east curb of 4th Street, although all utility work is complete and placement of the final curb and gutter was underway in early November. Completion of the pavement in preparation for reopening the east side of the street for traffic was planned for November 9, but was to be coordinated with paving work to the south in the STS project area. In

the station box, the contractor continued installation of stairs 1 and 4 from the concourse to the mezzanine and on to the surface. Installation of the stairs is forecast to be completed November 18. Shotcrete for the final wall surface at the concourse level was placed on October 7. Struts and walers for the invert level of the station box were completed on November 4, as previously scheduled. Excavation for placement of the mud slab below the invert was due to be completed by November 11. Work to prepare for the placement of the invert slab will continue into early 2017.

Surface, Track, and Systems (STS): The two revised schedule performance targets for this work package are: *a) complete all utility work by the end of the first quarter of 2017 (pushed back from the end of 2016 due to ongoing private utility conflicts)* and b) start work on special trackwork at Bluxome Street by the end of 2016 *(unchanged from September).* SFMTA and the contractor are working to resolve numerous utility conflicts along 4th Street including coordination of contract work with relocation work by private communication companies and Pacific Gas & Electric (PG&E). *These conflicts have made it impossible to complete all utility relocation work by the end of 2016.* Muni Traction Power duct bank (MRY), alternative water supply system (AWSS), street lighting, traffic signal, and sewer work continued. Slip-lining of the old 78-inch sewer was completed as planned in September. *A curved section of this sewer that conflicts with the trackway at 4th and Brannan streets was relocated in October, and various side structures and manholes will be completed for this line in November. Work on a 48-inch sewer and a 36-inch force main is following the relocation of the curved 78-inch sewer and relocation of communication lines in the same area. Work on these sewer lines is expected to continue through November.* **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. The Resident Engineer (RE) for STS demonstrates a clear understanding of the work to be completed, the required sequence, and the third party coordination that must occur to complete the work.**

The last 730-foot sections of the tunnel invert slab between YBM and the tunnel portal were underway in early November and scheduled to be complete on November 23.

Despite the focused attention of the CSP's senior management team on achievement of the short term performance milestones, the critical milestone at *CTS was missed by a wide margin*. **As discussed in the Schedule section of this report, *the ongoing schedule slippage due to lower than planned production for the CTS SEM mining must be arrested and* 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 RSD of *August 15, 2019. In the opinion of the PMOC, the effectiveness of SFMTA's current efforts to improve schedule performance will be evident late in the second quarter of 2017. By this time, much of the original station construction schedule will have been consumed, leaving relatively little time to recover the accumulated delays.***

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

Bay Area Rapid Transit

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. Safety training of the workers is being scheduled and will be followed by scheduling of the necessary track access to complete the work. Completion is now expected in early 2017.

California Department of Transportation (Caltrans)

An Encroachment Permit is needed to install electrical 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)

Coordination is ongoing for the installation of new water and sewer facilities along 4th Street.

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 Light Rail Vehicles (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 well ahead of the CSP opening date. *Production of the first two cars has been completed and testing is underway at the assembly facility. Work on the structure of the third and fourth cars is complete and compression testing is underway. A contract change order was executed in September.*

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 *September 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

At the October station construction status meetings, the 1300 contractor raised the possibility of Buy America compliance issues with cooling equipment and components of the glazing systems for the three underground stations. *In the case of the cooling equipment, the contract specifications for the Variable Refrigerant Flow (VRF) cooling units identify four manufacturers that are all foreign, and the contractor has not been able to identify a domestic supplier that can meet the specifications. SFMTA has indicated that it intends to seek a waiver of Buy America requirements for this equipment, citing examples from other FTA-funded projects where waivers were granted by FTA for similar equipment. SFMTA is assembling information in advance of scheduling a meeting with FTA to discuss the proposed waiver request.*

In the case of the glazing system components, the contractor did state that he was unable to identify Buy America compliant materials for several items. *SFMTA and its designer are researching the affected materials and equipment and are confident that domestic sources are available.*

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 organizational 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.** The First Quarter 2016 update is overdue.

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. Several CSP project staff members are focused on development of an as-built record of the construction for the 1300 Contract, and SFMTA has hired another experienced scheduler to work on this effort. ***The PMOC notes that progress is being made in resolving the backlog of change order requests by the contractor, with the number of executed contract modifications increasing in the latest quarter.*** Several long-

standing major change orders and time impact claims remain to be resolved, but SFMTA has initiated discussions with the contractor on some of the oldest issues.

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 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. **In the opinion of the PMOC, the trend log tracking should include the amount of time that has passed from the initial identification of the trend. The average time taken to resolve trends should also be tracked.** *The PMOC has observed some improvement in the progress of contract change processing reflecting the emphasis of the management team in reducing the backlog of contractor change requests. CSP senior managers review the status of pending changes with RE staff members for each work package every other week in an attempt to reduce this backlog and have set an objective of having fewer than 10 change requests that require merit determination.*

A total of 40 contract modifications had been executed for the 1300 Contract as of *November 2, 2016,* with six CMods executed since early September. The total value of executed CMods is $3,884,303, which is lower than the total in September due to the execution of deductive modifications. Note that tables 2 and 3 reflect the project status as of the end of *September 2016* and show different values for approved contract changes.

Project Cost (*as of September 30, 2016*)

Cost estimate: $1.5783 billion.

Total contingency: *$79.03 million (minimum contingency is $60 million), reduced slightly from August.*

Total net incurred costs: *$989,957,714, an increase of $12.15 million from August (62.72% of the total project budget).*

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

Earned Value (EV): *$986,306,119, an increase of $5.88 million from August.*

Planned Value (PV): *$1,270,901,613, an increase of $15.05 million from August.*

Cost Performance Index (CPI): *1.00.*

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	*39,925,000*
Extra Budget for Non-Project Costs	6,173,508	
Approved Budget	235,913,500	*879,601,400*
Approved Changes	1,814,428	*3,880,647*
Current Contract (1252 does not include non-project costs)	235,398,443	*843,557,047*
Remaining Contingency	515,057	*36,044,353*
Potential Changes (Trends)	170,654	*21,785,481*
Estimate at Completion	235,569,097	*865,342,528*
Contingency Less Trends	344,403	*14,258,872*
Spent to Date	233,793,900	*422,761,935*
Potential Left to Spend	1,775,197	*442,580,593*
Contingency Less Trends as % of Potential Cost to Complete	19.4%	*3.2%*

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

The remaining contingency, less identified trends, represents about 19% of the potential left to spend for Contract 1252. In August SFMTA transferred $20 million from unallocated contingency into the 1300 Contract. After potential changes are accounted for, there is now $*14.3* million in contingency remaining for Contract 1300. **In the opinion of the PMOC, the transfer of unallocated contingency to the budget for the 1300 Contract contingency was appropriate. The resulting contingency of *3.2%* of potential remaining spending after potential changes are accounted for is tight, but could be sufficient**. *The combined allocated contingency for all construction work less identified trends is now $15.76 million, or 3.5% of the potential remaining work.* **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 is now more in line with the likely contract cost given the pending contract changes. While the allocated contingency is somewhat low, given the amount of work remaining, there appears to be sufficient unallocated contingency and excess allocated contingency from other program components to cover any additional cost increases.**

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 *10.7%* of the potential remaining spending, which, in the opinion of the PMOC, is sufficient to provide reasonable confidence in an 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		$ -	$ 285,712,152	$ 207,735,496	66%	$ 108,190,585		$ -	$ -	$ -	$ -	$ -
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	$ 61,365,677	82%	$ 13,041,518		$ -				
10.07	Guideway: Underground tunnel	$ 224,933,257			$ 200,808,300	$ 140,958,303	63%	$ 83,974,954						
10.09	Track: Direct fixation	$ 7,293,157			$ 6,761,089	$ 2,647,916	36%	$ 4,645,241						
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		$ -	$ 593,093,374	$ 299,749,369	69%	$ 132,949,366		$ -	$		-	$ -
20.01	At-grade station	$ 774,913		$ -	$ 6,673,138	$ 1,517,375	196%	$ (742,462)		$ -				
20.02	Aerial station, stop, shelter, mall, terminal, platform	$ -			$ 3,616,013	$ -	#DIV/0!	$ -						
20.03	Underground station	$ 412,084,888			$ 561,102,386	$ 294,738,286	72%	$ 117,346,602						
20.07	Elevators, escalators	$ 19,838,934			$ 21,701,837	$ 3,493,708	18%	$ 16,345,226						
40	**SITEWORK & SPECIAL CONDITIONS**	$ 232,551,627		$ -	$ 206,736,879	$ 189,332,496	81%	$ 43,219,131		$			-	$ -
40.01	Demolition, clearing, earthwork	$ 8,887,028			$ 11,296,936	$ 10,715,171	121%	$ (1,828,143)						
40.02	Site utilities, utility relocation	$ 29,562,587			$ 57,365,465	$ 61,019,223	206%	$ (31,456,636)						
40.03	Haz. Material, contam'd soli removal, ground water	$ 2,957,442			$ 7,301,393	$ 4,236,986	143%	$ (1,279,544)						
40.04	Environmental mitigation	$ 3,146,216			$ 1,020,165	$ 641,366	20%	$ 2,504,850						
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	$ 2,249,234	16%	$ 12,144,676		-				
40.07	Automobile, van, bus accessways, including roads	$ 11,919,550			$ 6,967,874	$ 2,161,465	18%	$ 9,758,085		$ -				
40.08	Temporary facilities and other construction indirect	$ 158,790,820			$ 110,323,109	$ 105,602,620	67%	$ 53,188,200		$ -				
50	**SYSTEMS**	$ 108,429,774		$ -	$ 95,371,098	$ 20,048,357	18%	$ 88,381,417		$ -	$ -	$ -	$ -	$ -
50.01	Train control and signals	$ 37,447,116			$ 28,031,423	$ 6,876,113	18%	$ 30,571,003						
50.02	Traffic signals and crossing protection	$ 3,013,232			$ 12,584,529	$ 7,747,184	257%	$ (4,733,952)		$ -				
50.03	Traction power supply	$ 20,379,634			$ 21,487,073	$ 4,128,353	20%	$ 16,251,281						
50.04	Traction power distribution	$ 16,239,951			$ 12,441,113	$ 1,227,703	8%	$ 15,012,248						
50.05	Communications	$ 28,545,305			$ 12,062,374	$ 69,003	0%	$ 28,476,302		$ -				
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	$ 1,162,075,792	$ 18,837,711	$ 1,180,913,503	$ 716,865,718	66%	$ 372,740,499	$ 1,130,842,776	$ 12,351,318	$ 21,956,135	$ 448,284,511	$1,165,150,229	$ (75,544,012)
60	**ROW, LAND, EXISTING IMPROVEMENTS**	$ 37,398,029	$ 32,246,321	$ 5,265,478	$ 37,511,799	$ 30,731,457	82%	$ 6,666,572	$ 36,511,799	$ (4,036,559)	$ -	$ 1,514,864	$ 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	$ 28,322,027	84%	$ 5,476,002	$ 34,331,288	$ (4,265,478)		$ 1,514,864	$ 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	$ 2,147,782	8%	$ 24,237,871	$ 13,309,000	$(10,799,712)	$ -	$ 11,161,218	$ 13,309,000	$ 13,076,653
70.01	Light Rail Vehicles	$ 26,385,653	$ 13,309,000	$ 13,076,653	$ 26,385,653	$ 2,147,782	8%	$ 24,237,871	$ 13,309,000	$(10,799,712)		$ 11,161,218	$ 13,309,000	$ 13,076,653
80	**PROFESSIONAL SERVICES**	$ 361,568,360	$ 310,518,041	$ 18,221,079	$ 328,739,120	$ 240,212,758	66%	$ 121,355,602	$ 328,739,120	$ -	$ -	$ 70,563,892	$ 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	$ 89,012,544	$ 13,905,845	$ 102,918,389	$ 63,095,878	33%	$ 127,929,922	$ 102,918,389	$ -		$ 25,916,666	$ 89,012,544	$ 102,013,256
80.04	Construction Administration & Management	$ 15,495,521	$ 91,046,881	$ 2,956,812	$ 94,003,693	$ 57,292,828	370%	$ (41,797,307)	$ 94,003,693	$ -		$ 33,754,053	$ 91,046,881	$ (75,551,360)
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	$ 4,872,536	67%	$ 2,369,804	$ 8,262,604	$ -		$ 3,390,068	$ 8,262,604	$ (1,020,264)
80.07	Surveys, Testing, Investigation, Inspection	$ 234,036	$ 883,100	$ -	$ 883,100	$ 13,740	6%	$ 220,296	$ 883,100	$ -		$ 869,360	$ 883,100	$ (649,064)
80.08	Start up	$ 8,400,329	$ 6,991,907	$ 1,358,422	$ 8,350,329	$ 817,966	10%	$ 7,582,363	$ 8,350,329	$ -		$ 6,173,941	$ 6,991,907	$ 1,408,422
Subtotal (10-80)		$ 1,514,958,259	$ 1,518,149,154	$ 55,400,921	$ 1,573,550,075	$ 989,957,715	65%	$ 525,000,544	$ 1,509,402,695	$ (2,484,953)	$ 21,956,135	$ 531,524,485	$1,521,223,591	$ (6,265,332)
90	**UNALLOCATED CONTINGENCY**	$ 63,341,742		$ 4,749,924	$ 4,749,924	$ -	0%	$ 63,341,742	$ -	$ -	$ -	$ -	$ -	
Subtotal (10-90)		$ 1,578,300,001	$ 1,518,149,154	$ 60,150,845	$ 1,578,299,999	$ 989,957,715	63%	$ 588,342,286	$ 1,509,402,695	$ (2,484,953)	$ 21,956,135	$ 531,524,485	$1,521,223,591	$ 57,076,410
100	**FINANCE CHARGES**	$ -			$ -	$ -		$ -	$ -	$ -		$ -	$ -	$ -
TOTAL PROJECT COST (10-100)		$ 1,578,300,001	$ 1,518,149,154	$ 60,150,845	$ 1,578,299,999	$ 989,957,715	63%	$ 588,342,286	$ 1,509,402,695	$ (2,484,953)	$ 21,956,135	$ 531,524,485	$1,521,223,591	$ 57,076,410

SCC Breakdown of Forecast Construction Costs Not Available

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

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. Based on the expected final contract value, change orders for the base work are forecast to represent less than 1 percent of the original contract amount, which represents exceptionally good change order control.

SFMTA is maintaining its management tools for tracking potential contract changes for the 1300 Contract. The latest summary report is titled "CN1300 Trend Statistics" and is dated November 2, 2016. This report shows that 40 contract modifications have been approved (six additional CMods since September) for a net increase in the contract value of $3,884,303. *No CMods have been executed since early October 2016. CORs (generated by the contractor) that have been determined to have merit and PCCs (generated by SFMTA) have a combined expected value of $24,412,779 in increased contract value, an increase of $3.16 million since October 10. An additional 438 items are being tracked in the Trend Log with a net value of $18.82 million in possible contract value increases.* Of these, *214* 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 *193* items have been voided and are carried at no cost. There are *16* items covered by certified claims and notices of potential claims by the contractor ($7.1 million total exposure), and 15 items are "open" or "new" and awaiting a determination of merit.

The most recent version of the complete Trend Statistics Summary for the 1300 Contract dated *November 2, 2016* shows a total potential increase in contract cost of *$47,114,952* including the $3.88 million in contract cost increases executed thus far. *The total estimated cost impact of the identified trends increased by about $3.43 million from October to November*. 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 - $732,157
7. Utility conflicts with 12-inch 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 - $1,998,320

12. Change to Irwin brand switch machines - $391,909
13. Additional instrumentation for detection of ground movement - $429,777
14. Time impacts due to power pole conflict during demolition at CTS - $3,516,164
15. Removal of temporary facilities from 1252 Contract in tunnel - $431,423
16. Additional traffic control requirements at 4th and King - $675,001
17. Incomplete design details for conduits between UMS and CTS - $300,001
18. Additional traffic control requirements for STS work package - $1,032,302
19. *Cost of changes to the design of CTS to accommodate the plaza requested by the community - $4,618,428 (increased from $4,500,001; cost to be paid by funds outside the program)*
20. Changes to utility design at YBM - $627,854
21. Contractor-claimed delay costs due to re-sequencing of work at CTS - $250,001
22. Missing conduit between manholes at UMS - $250,001
23. Change in vent for emergency generator at all stations - $500,001
24. Contractor-claimed change in contract requirements for pre-loading permanent struts at UMS - $1,853,352
25. Slip lining of 78-inch sewer in 4th Street - $966,687
26. Change to soil nails and shotcrete from sheet piles at Union Square Garage - $896,524
27. Contractor claim that wayside signals are extra - $1,512,373
28. *Change to grout details and drainage piping at UMS - $630,104 (increased from $250,001)*
29. Change in automatic train control system for reverse running - $400,001
30. Design issues with internal station drainage at UMS - $866,709
31. *Costs associated with differing site conditions for Level 3 Duct Bank – 2,400,001 (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)

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 October representing progress on the project through September 2016. SFMTA reported that it had again rejected the contractor's schedule submittal for September 2016 due to logic problems. **The PMOC remains concerned that SFMTA and TPC are unable to agree on the requirements for the contractor's schedule update so that TPC can produce schedule updates that will be accepted. An agreed project schedule from the contractor is critical to the evaluation and agreement on schedule recovery strategies. The PMOC is further concerned that unresolved responsibility for the accumulated delays to date is hindering SFMTA and TPC from working together to identify schedule mitigation measures.**

The September 2016 master program schedule update indicates that the construction work continues to fall further behind schedule, with an additional 14 days of delay accruing in the month of September. 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 August 15, 2019, 7.5 months later than planned.* There is negative float on the project critical path, and major 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 September 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 that SFMTA would approve. ***Additionally, it has become apparent that the projected durations of mining tasks at CTS may not be achievable, based on the contractor's inability to complete the current mining tasks on the planned schedule.*** SFMTA and TPC have set schedule performance milestones for each work package in an attempt to keep all parties focused on advancing work that is critical to the overall program schedule. The PMOC notes that none of the most recent schedule achievement milestones was met.

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 each of the past few months. **In the opinion of the PMOC, the recent schedule slippage has been due to actual production rates for underground mining at CTS being lower than planned. There is no indication that production rates are increasing and, with a year of underground mining work to be completed, there is a significant risk of further schedule delays.**

SFMTA and TPC have established new schedule performance goals for each of the work packages. The goal for CTS is to complete the first ring of the south platform cavern by March 28, 2016. SFMTA states that construction progress can be accelerated once this work is completed by progressing the mining work in two directions at once. The contractor also plans to continue excavation work below the roof deck at UMS during the holiday construction moratorium, using the night shift for removal and disposal of the spoils. ***In the opinion of the PMOC, it will possible to evaluate the effectiveness of SFMTA and TPC efforts to arrest the schedule slippage and***

possibly recover some of the accumulated delay sometime in the second quarter in 2017 after the most recent schedule milestone has been achieved.

Table 5 shows the latest milestones and the current status for each.

Table 5 - Interim Milestones for CTS Construction Progress[1]

Milestone	Target Date	*Status*
Complete first ring of the south platform cavern at CTS	*March 28, 2017*	*Barrel vaults being constructed*
Install mezzanine level struts and walers at UMS	*February 14, 2017*	*Excavation underway*
Complete invert slab for station box at YBM	*September 15, 2016*	*Milestone eliminated to maintain access for tunnel invert slab placement north of YBM*
Complete all utility work	*March 31, 2017*	*Numerous private utility conflicts being addressed*
Start special trackwork at Bluxome	By end of 2016	*On track*

[1] *SFMTA Management Meeting, 10/31/2016*

The PMOC convened a second schedule workshop for the project on June 22 and 23, 2016. 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 Advanced Train Control System (ATCS) testing;
- STS work (Radiax, Train Control and Software) leading to ATCS testing;
- CTS work leading to building startup and testing; and
- 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, *presuming that the ongoing schedule slippage at CTS can be arrested.* 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. SFMTA 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. SFMTA agreed to several new action items that will lead to an updated schedule and projection of likely RSD outcomes (see Table 8). The PMOC notes that SFMTA has produced an initial draft of the Rail Activation Plan (RAP), which is a good first step in planning for testing, commissioning, acceptance, and other start-up activities.

Project Schedule Data

Earned Value (EV): $*986,306,119, an increase of $5.88 million from August.*

Planned Value (PV): *$1,270,901,613, an increase of $15.05 million from August.*

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**.** *Earned value was substantially less than planned value, indicating that construction progress was well behind plan.*

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

Table 6 - Schedule Milestones

	(P = Planned Date, A = Actual Date, F = Forecast Date)
Preliminary Engineering (PE):	Authorized in July 2002 (A)
Record of Decision:	Issued November 26, 2008 (A)
Final Design (FD):	Authorized in January 2010 (A)
FFGA Request:	Submitted September 2011 (A)
FFGA Executed:	October 11, 2012 (A)
Ground Breaking: (Utility Relocation Contract)	February 9, 2010 (A)
Tunnel excavation complete (hole through):	June 2, 2014 (SB); June 11, 2014 (NB) (A)
Cross passages complete:	December 20, 2014 (P); April 15, 2015 (A)
Tunneling substantial completion:	April 15, 2015 (A)
Station construction Notice to Proceed (NTP):	June 17, 2013 (A)
Station construction substantial completion:	February 24, 2018 (P); *March 5, 2019 (F)*

	(P = Planned Date, A = Actual Date, F = Forecast Date)
RSD:	December 26, 2018 (P); *August 15, 2019* (F)

The current master schedule incorporating the approved 1300 Contract baseline schedule and updated actual progress through *September 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 7.5 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 August 15, 2019)*

Three Month Look-ahead

The following activities are planned over the next three months:

1300 Contract

UMS

Complete utility placement, backfill, and paving of Ellis Street

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

Complete excavation for fan plant to be located under the garage

Start erection of structural steel at north station entrance

Excavate and install struts and walers for intermediate level and mezzanine level of station box

Complete invert slab in the north concourse

Complete construction of access shaft at O'Farrell Street

CTS

Continue excavation of the station platform caverns

Provide compensation grouting as needed

YBM

Install temporary struts and walers at level 6 in headhouse

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

Begin installation of ducts and other sub-invert facilities

Place invert slab for station box

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

Continue construction of rooms and equipment platforms on the mezzanine and concourse levels

STS

Sewer installation and repair

Waterline installation

AWSS installation

Muni ductbank installation

Start of street restoration and final paving

Installation of special trackwork at 4th and Bluxome

Start installation of tunnel lighting

Installation of overhead contact system support poles

Placement of tunnel walkways

The PMOC expects to attend the following meetings:

- Weekly Management (*December 6, January 3, and February 6)*
- Weekly Contract 1300 Construction Progress Meetings (*first Tuesday and Wednesday of December, January, and February*)
- Weekly Configuration Management Board (CMB) (first Wednesday of December, *January, and February*)
- Monthly CSP Risk Management Meetings (first Thursday of *January and February)*
- CSP month-end meetings on *December 6, January 3, and February 7*
- FTA/QPRM scheduled for *February TBD, 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 averse 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 concerns for the 1300 Stations Contract were identified in the SFMTA September monthly report:

- TPC performing work prior to receipt of approval status of required submittals. SFMTA notes that additional Initial and/or Preparatory Phase Quality Meetings greatly contribute to preventing work prior to obtaining submittal/Request for Information (RFI) approval.
- TPC's refinement of its process to prepare record drawings (as-builts) to include CNCRs and timely recording of work that is performed that is inconsistent with the Conformed Design Drawings. *Continued* progress toward meeting the intent of the contract with regard to as-built records was noted in the latest SFMTA monthly progress report.

As of November 1, 2016, 244 CNCRs had been filed by TPC's Quality Manager (4 more than in early October). 19 new items were under review, 9 other items had responses identified but not yet approved, the proposed responses to 7 items were disapproved, and 15 items had approved responses that were not yet implemented. 161 items were closed, and 33 items had been voided. None of the open or disapproved items is delaying progress of the work.

The PMOC conducted a Quality Review of the CSP in September 2015, and a draft report was delivered to FTA for review late that month. 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

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 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 September 2016	No. of Incidents	Incident Rate[1]	Goal
1300 Contract			
OSHA Recordable Accidents	5	*0.74*	<3.4
Job Transfer/Restricted Duty Incidents	0	0	NA
Lost Time Incidents	*1*	*0.15*	<1.6
Total Incidents	*6*	*0.88*	NA
Hours Worked	*1,357,685*		

[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 determine a range of likely actual RSDs based on the updated schedule, possible recovery of accumulated delays, and remaining schedule risks. 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 September 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 and 234 – Excavation of the cross-cut cavern at CTS causes ground settlement and damage to old utilities above the station or to adjacent buildings. Excavation of the top and side drifts of the cross-cut cavern is complete with no ground movement detected by the numerous instruments above the station. The risk was planned to be retired when the cross-cut cavern was completed.
- Risk 46 – Complaints from nearby residents causing a need to change the CTS work schedule or means and methods was discussed. There have been recent complaints from residents in the Mandarin Tower regarding noise from the CTS worksite. The ventilation fans that provide fresh air in the excavation are a source of constant noise that has been measured at levels above the maximum allowable noise limits and is an annoyance due to the constant sound produced. Sound attenuation devices were attached to the ventilation equipment and these have been effective in reducing the complaints regarding noise. SFMTA continues to manage the noise issues by keeping material deliveries, which are another source of frequent complaints, out of the early morning hours and limiting construction work on Sunday mornings when the nearby churches have their weekly services.

- Risk 232 – Inability to recover from schedule delays results in late RSD. Schedule delays continue to accrue as time is passing. 18 days were lost on the critical path in July. SFMTA is working on an evaluation of the causes of delays through creation of an as-built schedule and is planning to add another experienced scheduler to expedite this analysis. To the extent the contractor is responsible for delays, it must identify means to recover the delay. **In the opinion of the PMOC, even if the contractor is shown to be responsible for all or most of the accumulated delays, it may not be possible to identify effective recovery measures that can make up all of the lost time.**
- Risk 204 – Delays due to AT&T not meeting the schedule for abandoning its facilities in the at-grade section of the line. This risk was retired.
- Risk 230 – SFMTA testing, commissioning, and pre-revenue service activities are delayed. This risk was assigned a high probability of occurrence, a medium cost impact, and a high schedule impact. SFMTA is preparing a RAP that will be used to plan the testing, commissioning, and other start-up activities. A key element of the mitigation strategy for this risk is to assure that the project is ready for the "barn sign-up" for operators prior to the RSD. There is only one barn sign-up per year and missing the one prior to the RSD could result in a major delay to the start of service.

A list of the top risks discussed at the September 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	**165**	Develop recovery schedule	12/10/15	TBD		See action items below, which are precursors to the recovery schedule
S, RA	**166**	Update schedule risks based on recovery schedule	12/10/15	TBD		Once the schedule tool and recovery schedule are complete
S	**168**	Provide details for train control testing schedule	6/23/16	11/1/16		*Testing schedule being integrated into master program schedule*
S	**169**	Review and address logic errors and acceleration strategies in the schedule	6/23/16	*12/15/16 (new date)*	Ongoing evaluation	Initial changes implemented by SFMTA. TPC needs to agree to some of the changes
S	**171**	Provide a range of dates for the Revenue Start Date	6/23/16	TBD		Depends on results of other action items
S	**172**	Provide completed as-built construction schedule	8/4/2016	11/23/2016		In process.

(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
ATCS	Advanced Train Control 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
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
O&M	Operations & Maintenance
OHA	Operational Hazard Analysis
OP	Oversight Procedure
PCC	Proposed Contract Changes
PE	Preliminary Engineering
PG&E	Pacific Gas & Electric Co.
PHA	Preliminary Hazard Analysis
PMOC	Project Management Oversight Contractor
PMP	Project Management Plan
PTMISEA	Public Transportation Modernization, Improvement, and Service Enhancement Account
PV	Planned Value
QA/QC	Quality Assurance/Quality Control
QMP	Quality Management Plan
QPRM	Quarterly Progress Review Meeting
QTR	Quarter
RAMP	Real Estate Acquisition Management Plan
RAP	Rail Activation Plan
RCMP	Risk and Contingency Management Plan
RE	Resident Engineer
RFI	Request for Information
ROD	Record of Decision
RSD	Revenue Service Date
SBE	Small Business Enterprise
SCIL	Safety Certifiable Item List
SCP	Safety Certification Plan
SEIS	Supplemental Environmental Impact Statement
SEM	Sequential Excavation Method
SEPP	Security and Emergency Preparedness Plan
SFDPW	San Francisco Department of Public Works
SFFD	San Francisco Fire Department
SFMTA	San Francisco Municipal Transportation Agency
SFPUC	San Francisco Public Utilities Commission
SIT	Systems Integration Test
SoMa	South of Market (Street)

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

APPENDIX B. SAFETY AND SECURITY CHECKLIST

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

Central Subway Project Overview			
Project mode (Rail, Bus, BRT, Multimode)	Light Rail Transit		
Project phase (Preliminary Engineering, Design, Construction, or Start-up)	Construction		
Project Delivery Method (Design/Build, Design/Build/ Operate/Maintain, CM/GC, etc.)	Design-Bid-Build		
Project Plans	*Version*	*Review by FTA/FRA*	**Status**
Has the oversight agency reviewed and approved the grantee's SSPP as per Part 659.17?	Y		SFMTA currently operates its LRT system in compliance with an SSPP approved by the CPUC. These plans will be revised, as required, to incorporate the addition of the CSP during the late construction and early testing phase and submitted to the CPUC for approval prior to the planned start of revenue operations.
Has the oversight agency reviewed and approved the grantee's Security Plan or SEPP as per Part 659.21?	Y		See above.
Did the oversight agency participate in the last Quarterly Program Review Meeting?	Y		
Has the grantee submitted its safety certification plan (SCP) to the oversight agency?	Y		SFMTA submitted the SSCP to CPUC staff for review and Commission approval during the preliminary engineering phase. The plan was approved in March 2009. The SSCP revised in November 2011 was submitted to the CPUC and was approved.
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:	*November 10, 2016*
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
08/15/2019		Revenue Operations Date at date of this report	

62.5% *Percent Complete Based on Progress* (*September 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
$989.96 million	Amount of Expenditures at date of this report from Total Project Budget of $1,578 million
62.72%	Percent Complete based on Expenditures at date of this report
$4.75 million	Unallocated Contingency remaining
$79.03 million	Total Project Contingency (allocated and unallocated contingency as reported by CSP)
$60 million	Minimum Total Project Contingency revised on September 5, 2012 PMOC review of Contingency Management Plan

	AT HOLD POINTS	QTR	Minimum Contingency Levels	Revised Levels
1A	Hold Point 1a – Tunnels 100% designed February 2011 (Actual)	1Q11	280	280
1B	Hold Point 1b – CTS 100% designed June 2012 (Actual)	4Q11	250	240
1C	Hold Point 1c – 40% Bid (Tunnel and CTS)	2Q12	225	200
1D	Hold Point 1d – FFGA Award October 2012 (Actual)	3Q12	-	180
2	Hold Point 2 – Commence CTS / UMS construction (Actual June 17, 2013)	2Q13	160	160
3	Hold Point 3 – Demobilize Tunnels *(Actual April 15, 2015)*	*2Q15*	140	140
4	Hold Point 4 – Stations to platform levels (CTS/YBM) November 2016	4Q16	60	60
5	Hold Point 5 – Complete CTS / Tunnels systems inst. April 2018	2Q18	25	25
RSD	PMOC / FTA RSD	4Q18		
CURRENT TOTAL CONTINGENCY $79.03 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.
EMBARCADERO
California St.
Leavenworth St.
Bush St.
Post St.
FUTURE TRANSBAY TERMINAL
FOLSOM
MONTGOMERY
UNION SQUARE/ MARKET STREET
J K L M N T
Market St.
Mission St.
1st St.
N
POWELL
Howard St.
2nd St.
Folsom St.
Harrison St.
BRANNAN
Golden Gate St.
4th St.
I-80
YERBA BUENA/ MOSCONE
5th St.
3rd St.
2ND ST. AND KING
CIVIC CENTER
7th St.
6th St.
4TH ST. AND BRANNAN
AT&T BALLPARK
King St.
4TH AND KING/BERRY N T
Bryant St.
Brannan St.
Caltrain
Townsend St.
MISSION ROCK
UCSF
UCSF MISSION BAY
LEGEND
T Third Phase 2
T Third Phase 1
Muni Metro
Caltrain
BART

APPENDIX D. TOP PROJECT RISKS

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

Top Risks Discussed in the Previous Month:

#46 – Public complaints led to a need to revise the CTS work sequence, resulting in delays. There have been recent complaints regarding noise from the construction operations at CTS, especially during the extended work hours on evenings and Sundays. SFMTA and the contractor are working with the community to limit the noise impacts of the work.

#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 appears to be increasing since delays are continuing to accrue. TPC is working extended hours to attempt to recover the delays. SFMTA and TPC are evaluating strategies to conduct concurrent work at the end of the construction schedule and to allow early start of testing and commissioning activities. SFMTA is preparing a detailed testing, commissioning, and pre-revenue service activity schedule. SFMTA also is completing its analysis of the responsibility for the accumulated delays and the amount of delay that the contractor is obligated to provide recovery for.

#233 – Related to the quality of the shotcrete lining substitution proposed by TPC being inferior. This risk continues, but SFMTA has seen good results from the permanent installation work at TBM. All of the nozzle operators working on shotcrete are certified. SFMTA and TPC are still working out the process/checklist to be used to confirm that the finished shotcrete panels meet contract requirements for location, surface quality, thickness, etc.

#234 – This risk that the contractor's proposed alternative Sequential Excavation Method (SEM) excavation method would cause subsidence will continue to be monitored until all SEM operations are completed. Closely related to risk# 52 and appearing to be minimal.

#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. This risk is closely related to #232.

#243 – Risk that contractor will be complacent in addressing damage claims from third 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.

#36 – Risk of damage to adjacent buildings due to heave from grouting operations. Minor non-structural damage has occurred at some locations and is being repaired. The compaction grouting operation is nearly complete.

#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, 2016. 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. This risk will be retired, as the demolition work is complete.

#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.

#229 – Risk of delayed completion of TPC acceptance tests. This risk will be rated at a future meeting. A schedule for start-up activities is being prepared and long-lead items are being identified. The major contributor to the risk is Train Control testing.

#230 – Risk of delayed completion of SFMTA testing, commissioning, and pre-revenue service activities. This risk was rated as having a high probability of occurrence, a medium cost impact, and a high schedule impact.

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 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	7/10/2019		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.

Roadmap to Revenue Operations - Central Subway Project, San Francisco Municipal Transportation Agency – DRAFT				
Description	**Estimated Start Date**	**Estimated Completion Date**	**Actual Completion Date**	**Notes**
Revenue Service				
Target Revenue Service Date	-	*8/15/2019*		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 5 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 *June 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	*$8.26 million*
	Current Contract Value	*$241.84 million*
	Expended to Date	$*234.88 million;* $6.2 million is paid from non-project funds
	% Expended	*97.1%*
	SBE Participation	5.8%
Schedule:	Final completion achieved May 15, 2015.	
Issues or Concerns:	None.	

Contract No.	**1277**	
Contract Description:	**Pagoda Palace Demolition**	
Status:	Construction is complete; contract is in close out.	
Cost:	Original Contract Value	$498,995
	Approved Change Orders	*$149,981*
	Current Contract Value	*$648,976*
	Expended to Date	*$648,976*
	% Expended	*100%*
	SBE Participation	100%
Schedule:		
Issues or Concerns:	None.	

Contract No.	**1300**	
Contract Description:	**Three subway stations (YBM, UMS, and CTS) and STS**	
Status:	*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	*$3.88 million*
	Current Contract Value	*$843.55 million*
	Expended to Date	*$422.76 million*
	% Expended	*50.1%*
	SBE Participation	*18.2%*
Schedule:	NTP issued June 17, 2013. Substantial Completion planned February 10, 2018 and *forecast March 2019.*	
Issues or Concerns:	The work on this contract is behind schedule.	

Contract No.	**CS-155-1**	
Contract Description:	**Design Package 1 for Contracts 1250, 1251, and 1252. PB/Telemon**	
Status:	Design is complete. Construction support is 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	*$7,845,082*
	% Expended	98.8%
	SBE Participation	*29.7%*
Schedule:		
Issues or Concerns:		

Contract No.	**CS-155-2**	
Contract Description:	**Design Package 2 for UMS, CTS, and YBM. CSDG prime**	
Status:	Designs are complete for all of the station contracts. Construction support of Contract 1300 is underway.	
Cost:	Original Contract Value	$35,059,252
	Approved Change Orders	$1,460,360
	Current Contract Value	$36,519,612
	Expended to Date	*$33,587,7471*
	% Expended	*92.0%*
	SBE Participation	*41.1%*
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	*$25,495,248*
	% Expended	*148.0%*
	SBE Participation	*27.4%*
Schedule:		
Issues or Concerns:	*Contract is significantly over budget.*	

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	*$68,209,372*
	% Expended	*68.4%*
	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	*$9,413,265*
	% Expended	*55.0%*
	SBE Participation	29.1%
Schedule:		
Issues or Concerns:		