

Risk Mitigation Meeting Minutes #87

DATE: October 27, 2016
 MEETING DATE: **October 06, 2016**
 LOCATION: 530 Bush Street, 4th Floor – Small Conference Room
 TIME: 2:00pm
 ATTENDEES: Albert Hoe, Mark Latch, Beverly Ward
 COPIES TO: Attendees:, Eric Stassevitch, John Funghi Roger Nguyen, Jane Wang, Jeffrey Davis, Sanford Pong, Luis Zurinaga, Bill Byrne
 File: M544.1.5.0820
 REFERENCE Program/Construction Management
 SUBJECT: **Risk Management – Risk Mitigation Meeting
 Risk Mitigation Report No. 87**

RECORD OF MEETING

ITEM #		ACTION BY DUE DATE
1 –	Report (Risk rated rating ≥ 6)	
	<p>Risk 46: Public complaints result in unanticipated restrictions on construction at CTS. (schedule and estimate for underground work assumes 6 day work week and 2 shifts per day) <u>Discussion:</u> Efforts made to reduce the ventilation noise resulted in changing the housing unit. Work at the cross-cut cavern is ending. SFMTA expects the amount of noise heard will decrease as the work descends into the tunnel. The RE will provide a status update to the neighbors at the next scheduled community meeting. Risk Rating 6</p> <p>Risk 52: Unacceptable settlement and impact on major utilities at CTS (old sewer and others within 20ft space between top of cavern and street level) <u>Discussion:</u> Plans to install emergency gate valves are moving forward. Install of one 12" on the 100-year-old CIP system, and a 6" gate valve near Jackson/Stockton intersection on the 6" water line. Risk Rating 6</p> <p>Risk 205: Prolong period of CMod's creates additional cost/causes bad blood between Resident Engineer and Contractor0 <u>Discussion:</u> A number of contract modifications are being processed by SFMTA. Items categorize as an "F" item - Needs Merit Determination / Response on the weekly PCC COR log require action from the RE's in establishing merit and quantum. Risk Rating 6</p>	

ITEM #		ACTION BY DUE DATE
	<p>Risk 229: CN1300 Systems Acceptance Testing <u>Discussion:</u> A train control systems schedule will be incorporated into the Program's as built schedule, once actual dates are identified. Risk Rating 6</p> <p>Risk 230: SFMTA Commissioning Coordination <u>Discussion:</u> No status update for this month. SFMTA is currently developing the Rail Activation Plan (RAP). Risk Rating 6</p> <p>Risk 232: Behind Schedule - Unable to Recover from Delay to 1300 Contract <u>Discussion:</u> The Project cost control team is working on the as built schedule. The goal is to have the schedule completed by the beginning of November 2016. Risk Rating 12</p> <p>Risk 233: Acceptance of Shotcrete Substitution - leads to final product being inferior in performance <u>Discussion:</u> The final lining continues to be an open issue. The Program has yet to receive additional information as requested by the CM team to satisfy SFMTA's concerns for use of shotcrete in lieu of cast-in-place final lining. Risk Rating 9</p> <p>Risk 234: Sequential Excavation Method at CTS - Contractor's propose method will induce subsidence <u>Discussion:</u> Monitoring of gauges continues to show stability. A recommendation was made to review this risk next month as a potential candidate form retirement. Risk Rating 7</p> <p>Risk 238: Quality Program is ineffective in processing the nonconformance items causing schedule impacts <u>Discussion:</u> The quality program continues to progress well. There are no deficiencies in the generating of CNCR's as they arise. Risk Rating 6</p> <p>Risk 240: Unresolved Assignment of Schedule Delay Responsibility (may lead to increase cost for the Program) <u>Discussion:</u> The Program is continuing its efforts in getting an as built schedule by November 2016. Having this in place will allow the Program to ascertain who owns the delay. Risk Rating 8</p> <p>Risk 243: Contractor becomes complacent in third party insurance claims - could increase cost to the project <u>Discussion:</u> The Contractor is being responsive in addressing insurance claims. Knowledge by SFMTA of the dollar amount being payout is no known at this time. Risk Rating 8</p>	
2 -	Report on Active Risk (Rated ≤ 6)	
	<p>Risk 36: Damage to buildings or utilities as a result of heave from jet grouting <u>Discussion:</u> Jet grouting coring verification is ongoing. One or more properties have sustained damage likely due compensation grouting. Risk Rating 5</p>	

ITEM #		ACTION BY DUE DATE
	<p>Risk 48: Incomplete drawdown of groundwater at CTS (inside of box and inside of caverns) <u>Discussion:</u> Dewatering at the site is ongoing. Conditions are considered to be stable. Risk Rating 3</p> <p>Risk 99: Breakdown in relationships between SFMTA and Contractors during construction results in increased claims and delays to the overall construction schedule <u>Discussion:</u> Executive Partnering session with the 1300 Contractor (TPC) as well as with the DRB was held on September 8, 2016. Meetings with the RE's and TPC's Project Engineers are being held weekly to discuss progress and issues. Risk Rating 5</p> <p>Risk 103: Difficulty in getting required permits <u>Discussion:</u> Central Subway is working with Sustainable Streets to install traffic signal boxes in Caltrans right away. Risk Rating 2</p> <p>Risk 244: Olivet building - potential coordination issues <u>Discussion:</u> Anticipated PG&E work to take place around the time the Olivet building work completion, will affect both the Olivet building and work on Central Subway. This risk will continue to be tracked on the risk register. Risk Rating 2</p>	
	New Risk	
3-	There were no new risks were added to the Risk Register this month.	

ACTION ITEMS –

ITEM #	MTG DATE	DESCRIPTION	BIC	DUE DATE	STATUS
3	05/07/15	Risk 72 – 4 th & King - Develop a test plan checklist for recertifying	S. Pong	11/03/16	Open

Meeting adjourned at 2:50pm

These meeting minutes have been prepared by B. Ward, and are the preparer's interpretation of discussions that took place. If the reader's interpretation differs, please contact the author in writing within four (4) days of receipt of these minutes.

Signed:  [initials of preparer] Date: 11/1/16 [Date completed].

Meeting Agenda

Project No. M544.1, Contract No. CS-149
Program/Construction Management
Risk Mitigation Management Meeting No. 87
October 06, 2016
2:00pm – 4:00pm
 Central Subway Project Office
 530 Bush Street, 4th Floor
 Large Conference Room

Attendees:

William Byrne		Mark Latch		Beverly Ward	
John Funghi		Roger Nguyen		Luis Zurinaga	
Albert Hoe		Eric Stassevitch			

1. Report on Red Risks (Rated 6 and above)

- Construction Risks (46, 52, 205, 229, 230, **232**, 233, 234, 238, 240, 243)

2. Report on Remaining Requirement Risk

- Requirement Risk (104)

3. Report on Active Risks (Rated below 6)


- Construction Risks (36, 48, 99, 103, **244**)

Note: **Bolded** numerals indicate that risk is recommended to be retired.

Meeting Attendance Sheet

Project No. M544.1, Contract No. CS-149
Program/Construction Management
Risk Management Meeting No. 87
 October 06, 2016
 2:00 p.m. – 4:00 p.m.
 Central Subway Project Office
 530 Bush Street, 4th Floor
 Large Conference Room

Deliver Meeting Attendance Sheet with original signatures/initials to Document Control.

NAME	AFFILIATION	PHONE	E-MAIL (for minutes)	INITIALS
Bill Byrne	DEA/PMOC	720-225-4669	BByrne@deainc.com	
Jeffrey Davis	FTA	415-744-2594	Jeffrey.s.davis@dot.gov	
John Funghi	SFMTA	415-660-5403	John.funghi@sfmta.com	
Albert Hoe	SFMTA	415-660-5385	Albert.hoe@sfmta.com	
John Lackey	DEA/PMOC	503-499-0596	jal@deainc.com	
Mark Latch	CSP	415-660-5410	Mark.latch@sfmta.com	
Roger Nguyen	SFMTA	415-701-4312	Roger.Nguyen@sfmta.com	
Eric Stassevitch	CSP	415-660-5407	Eric.stassevitch@sfmta.com	
Beverly Ward	CSP	415-660-5386	Beverly.ward@sfmta.com	
Luis Zurinaga	SFCTA	415-716-6956	luis@sfcta.org	

A Hoe, was in attendance but did not sign in.

Risk Mitigation Status
Risk Reference: 36

Risk	Mitigation Strategy
Damage to buildings or utilities as a result of heave from grouting.	Tangent piles combined with surface jet grouting will be utilized.

Initial Assessment: 1, 1.5, 2
Current Assessment: Risk Rating 5 – Construction Risk

Risk Owner: S. Wilson

Status Log:

April 2012:

1. Mitigation strategy change to reflect “tangent piles” rather than “secant piles”.
2. Protection of Existing Property spec requires contractor to repair damage caused by their actions.

November 2015:

1. As part of an overall evaluation of the remaining requirement and design risk, as well as the low rated active construction risk. The committee preformed a reassessment of this risk to determine if its current Risk rating is still valid. The construction Risk rating will remain a 1.
2. Heave from the jet grouting did occur in the Macy’s basement

March 2016:

1. Very little grout has entered the buildings, when discovered the Contractor has addressed the issue.

July 2016”

1. Jet grouting is complete.
2. Risk description will be change to “Damage to buildings or utilities as a result of heave from grouting”.
3. The Committee performed a reassessment of the risk, rating will remain a 5.

August 2016:

1. Damage caused by grouting has not taken place.
2. This risk is no longer an issue and will be evaluated next month for recommendation to retire.

September 2016:

1. Jet grout verification coring is has not been complete.
2. Fluid reportedly infiltrated the Macy’s Men’s store from the nighttime coring activities.

October 2016:

1. Verification coring is still being performed.
2. There is more than one property with damage that needs to be addressed, including Macy’s, but these are likely due to compensation grouting not jet grout or jet grout coring.

Risk Mitigation Status**Risk Reference: 46 (CTS)**

Risk	Mitigation Strategy
Public complaints result in unanticipated restrictions on construction at CTS. (schedule and estimate for underground work assumes 6 day work week and 2 shifts per day)	<ol style="list-style-type: none"> 1. Public outreach. Maintain regular and open communications so Public knows construction plans and progress at all times. 2. Require Contractor to assist Public Outreach efforts, maintain access to businesses and assist with deliveries and pick-ups, control noise and vibration, continuously cleanup site, and provide pedestrian and vehicle traffic and protection plans, informational signage, ADA ramps and minimum sidewalk widths. 3. Require barriers to protect pedestrians and shield them from noise and dirt from construction. 4. Work with MOED to increase cleanup of the area and assist pedestrians across streets, as needed. 5. Monitor and enforce noise, vibration, ADA, traffic, and cleanup requirements. Quickly process and resolve damage and accident claims from the Public. 6. Assumed this work in cost & schedule estimates.

Initial Assessment: 2, 3, 6**Current Assessment:** Risk Rating, 6 – Construction Risk**Risk Owner:** D. Jacobson**Status Log:**

January 2012:

1. Implementation of mitigation measures part of Communication/Outreach plan and certain aspects to be included in the contract documents.

May 2013:

1. CCDC are assisting the Central Subway outreach effort in Chinatown
2. Weekly construction updates are being uploaded to the Central Subway website, translated copies will be hand delivered through Chinatown
3. The contractor will be required to comply with the contract specifications and City ordinances for noise and dust control.
4. Discuss revising mitigation strategies
 - '4' – MOED is not involved in Chinatown, contractor is required to maintain cleanliness adjacent to site

October 2013:

1. Community meeting held in September to notify merchants and residents that construction of the Chinatown station would be commencing soon.
2. 30day and 10day construction notices have been mailed out
3. Construction updates are being communicated weekly via social media, mailings, and the Central Subway website. CCDC are also hand delivering translated construction notices to project neighbors.

Risk Mitigation Status**Risk Reference: 46 (CTS)**

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Public complaints result in unanticipated restrictions on construction at CTS. (schedule and estimate for underground work assumes 6 day work week and 2 shifts per day)	<ol style="list-style-type: none"> 1. Public outreach. Maintain regular and open communications so Public knows construction plans and progress at all times. 2. Require Contractor to assist Public Outreach efforts, maintain access to businesses and assist with deliveries and pick-ups, control noise and vibration, continuously cleanup site, and provide pedestrian and vehicle traffic and protection plans, informational signage, ADA ramps and minimum sidewalk widths. 3. Require barriers to protect pedestrians and shield them from noise and dirt from construction. 4. Work with MOED to increase cleanup of the area and assist pedestrians across streets, as needed. 5. Monitor and enforce noise, vibration, ADA, traffic, and cleanup requirements. Quickly process and resolve damage and accident claims from the Public. 6. Assumed this work in cost & schedule estimates.

May 2014:

1. SFMTA has requested documentation from Tutor Perini that they are in compliance with noise readings and permit requirements.

July 2014:

1. Tutor Perini submitted the requested noise readings for a two week period and documentation to show the permit requirements.
2. The Contractor is performing continuous noise monitoring in addition to performing hand held readings once a week.

July 2016:

1. The Committee performed a reassessment of the risk, rating will remain a 6.

August 2016:

1. Sound from Exhaust Fans remains a huge issue, especially at night. RE (Doug) working on mitigation ideas to present to SFMTA and TPC. Need to navigate through who designs sound mitigation structure, who pays for it, and how quickly it can be installed.
2. Along east side of NEES work area, trash and debris building up along barricades has had negative impact on businesses. RE talked to TPC and they are complying with the clean up on a regular basis per General Provisions 3.19 A and Special Provisions outlined on S-9.
3. CTS Neighborhood is very upset with early morning truck traffic, which is sporadic, as well as fans through the night. TPC has made many efforts to inform their subcontractors and delivery folks, which will help a lot. There will be more truck traffic most probably because this is a major project and nearly impossible to inform every trucker who ever will come to this job to NOT show up before 7 am.

September 2016:

1. Continued efforts are being made to reduce the ventilation noise.
2. No neighborhood complaints have been received in the two weeks.

Risk Mitigation Status

Risk Reference: 46 (CTS)

Risk	Mitigation Strategy
Public complaints result in unanticipated restrictions on construction at CTS. (schedule and estimate for underground work assumes 6 day work week and 2 shifts per day)	<ol style="list-style-type: none"> 1. Public outreach. Maintain regular and open communications so Public knows construction plans and progress at all times. 2. Require Contractor to assist Public Outreach efforts, maintain access to businesses and assist with deliveries and pick-ups, control noise and vibration, continuously cleanup site, and provide pedestrian and vehicle traffic and protection plans, informational signage, ADA ramps and minimum sidewalk widths. 3. Require barriers to protect pedestrians and shield them from noise and dirt from construction. 4. Work with MOED to increase cleanup of the area and assist pedestrians across streets, as needed. 5. Monitor and enforce noise, vibration, ADA, traffic, and cleanup requirements. Quickly process and resolve damage and accident claims from the Public. 6. Assumed this work in cost & schedule estimates.

October 2016:

1. Frontier-Kemper General Superintendent removed the inverted “hats” off the top of the fan line and secured expanded metal screen. Fan noise decreased to under 77 dBA at 50 feet and was 65 dBA at 100 feet. Fans are set at 55 – 60% for now. Once full mining of north and south platform tunnels is underway, the expanded metal screen may no longer work (because of back-pressure) and this issue may need to be addressed at that time, probably in December 2016.
2. TPC and F-K are providing personnel to clean along the NEES along the east side of Stockton Street between Sta. 101+00 to 102+00 in the early morning on a daily basis.
3. Some barriers and banners need cleaning from graffiti; brought up in weekly progress meetings.

Risk Mitigation Status	
Risk Reference: 48	
Risk	Mitigation Strategy
Incomplete drawdown of groundwater at CTS (inside of box and inside of caverns).	<ol style="list-style-type: none"> 1. Require additional grouting to limit leakage to permissible level. 2. Include dewatering bid item in contract. 3. Include probable grouting and dewatering work in cost & schedule estimates.

Initial Assessment: 2, 1, 3

Risk Owner: D. Jacobson

Current Assessment: Risk Rating 3 – Construction Risk

Status Log:

February 2012:

1. Mitigation strategy “Include dewatering bid item in contract” was added to status log.
2. Bid item for dewatering has been included in the contract documents (TB – 14 Drilled Gravity Dewatering Pipes).

April 2016:

1. Continuing issue for CTS. Mark Kronke and Doug J are checking on bore logs, depth of dewatering wells, and drawdown depths in the area of tunneling. Most areas are show ground water above the crown of the tunnel.

May 2016:

1. Water levels are being monitored. The Task Force team is discussing the need for additional piezometer.

June 2016:

1. Currently, the Task Force has agreed that there is no need for an additional piezometer (COR#547). Dewatering continues with rates of approximately 1 gpm (gallon per minute) for the last month. As tunneling excavation continues for the Cross Cut Cavern, only slight drips are noted by the geologists (FK and PB) indicating the formations in the area are dewatered.
2. Contractor has 8 dewatering wells (90 to 120 feet deep) in the immediate vicinity of the Cross Cut Cavern and North Emergency Egress Shaft. Both locations are stable with no water intrusion issues at this time.

July 2016:

1. Work is ongoing.
2. The Committee performed a reassessment of the risk, rating will remain a 3.

October 2016:

1. Dewatering continues at a rate of 4-5 GPM for all dewatering wells. TPC installed three additional flow meters to see where most of the water is coming from. Most of the water is coming from south and west of the headhouse; also some from the west side of Stockton Street north of the headhouse. Dewatering conditions are considered stable.

Risk Mitigation Status**Risk Reference: 52**

Risk	Mitigation Strategy
Unacceptable settlement and impact on major utilities at CTS. (OLD SEWERS AND OTHERS WITHIN 20FT SPACE BETWEEN TOP OF CAVERN AND STREET LEVEL)	<ol style="list-style-type: none"> 1. Evaluate effect of potential settlement on utilities. 2. Slip-lined sewer by CTS contractor. 3. Other utilities will be reinforced as needed, monitored during construction, and repaired / replaced as needed. 4. Contractor to correct impact of settlements by repair. 5. Have contingency repair/restoration plan. 6. Utility contact information and procedure will be on plans. 7. Develop an allowance for utility repair. 8. Include probable costs in estimate.

Initial Assessment: 4, 2, 8**Risk Owner:** D. Jacobson**Current Assessment:** Risk Rating 6 – Construction Risk**Status Log:**

December 8, 2009 Meeting:

1. R. Edwards was identified as risk owner.
2. A. Hoe will status the mitigation strategy.
3. Mitigation strategy needs to establish metrics for acceptable settlement criteria.
4. Eliminated Mitigation Strategy Item 6: "Cistern at Washington St. will be repaired at the completion of construction and damaged pavements replaced" from this risk and will make a new Risk 52a to address the risk to the cistern.(Done)

January 21, 2010 Meeting:

1. An action from the last risk mitigation meeting to "move Mitigation Strategy Item No. 6 to a new Risk 52a" was not done. R. Rocco will update the register accordingly.

November 2011:

1. Revised mitigation strategy 1 to indicate slip-lining of sewer by CTS contractor, not TBM contractor.
2. Removed mitigation strategy 2 "will pre-install tubamachettes for compensation grouting".
3. Revised mitigation strategy 4 to eliminate use of compensation grouting to correct impact of settlement.
4. Sewers will be slip-lined prior to cavern construction.
5. Affected utilities requiring monitoring are listed in BP drawings.
6. Technical specifications address requirement for leak detection and mitigation plans to repair leaks.

January 2012 Meeting:

1. SFPUC submitted comments on the Effects of Settlement on Utilities report.
2. SFMTA will respond to comments.

February 2012:

1. Mitigation strategy added to "Develop an allowance bid item for utility repair".
2. SFMTA responded to comments. None of the responses change the mitigation strategy for this risk.

Risk Mitigation Status**Risk Reference: 52**

Risk	Mitigation Strategy
Unacceptable settlement and impact on major utilities at CTS. (OLD SEWERS AND OTHERS WITHIN 20FT SPACE BETWEEN TOP OF CAVERN AND STREET LEVEL)	<ol style="list-style-type: none"> 1. Evaluate effect of potential settlement on utilities. 2. Slip-lined sewer by CTS contractor. 3. Other utilities will be reinforced as needed, monitored during construction, and repaired / replaced as needed. 4. Contractor to correct impact of settlements by repair. 5. Have contingency repair/restoration plan. 6. Utility contact information and procedure will be on plans. 7. Develop an allowance for utility repair. 8. Include probable costs in estimate.

Initial Assessment: 4, 2, 8**Risk Owner:** D. Jacobson**Current Assessment:** Risk Rating 6 – Construction Risk

3. Leak detection requirements added to contract.
4. Allowance for utility repair included in contract.

September 2012 Meeting:

1. CTS has been resolved

October 2012 Meeting:

1. UMS & YBM yet to be closed out

May 2012:

1. **Recommend reducing this risk rating to 3 (2, 2, 1)** (reduce probability and cost impact)
 - a. Current probability (3), >50%, recommend reduce probability to (2), 10-50%
 - b. Current cost impact (3), \$1m - \$3m, recommend reduce cost impact to (2), \$250k - \$1m (CN 1300 CTS AL-8 = \$250k)
 - c. Current schedule impacts (1), <1 month, maintain schedule impact
2. Risk rating to remain at 6

January 2014:

1. Comments regarding UMS and YBM are still to be closed out with SFPUC.
2. A letter responding to the outstanding comments will be sent to SFPUC the week of January 13th

March 2014:

1. Letter was sent to SFPUC. Response from SFPUC is still pending.
2. SFPUC previous contact Betsey Eagon has left the division. SFMTA needs to identify the new contact person.

April 2014:

1. Response from SFPUC of outstanding comments is still pending.

Risk Mitigation Status**Risk Reference: 52**

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Unacceptable settlement and impact on major utilities at CTS. (OLD SEWERS AND OTHERS WITHIN 20FT SPACE BETWEEN TOP OF CAVERN AND STREET LEVEL)	<ol style="list-style-type: none"> 1. Evaluate effect of potential settlement on utilities. 2. Slip-lined sewer by CTS contractor. 3. Other utilities will be reinforced as needed, monitored during construction, and repaired / replaced as needed. 4. Contractor to correct impact of settlements by repair. 5. Have contingency repair/restoration plan. 6. Utility contact information and procedure will be on plans. 7. Develop an allowance for utility repair. 8. Include probable costs in estimate.

Initial Assessment: 4, 2, 8**Risk Owner:** D. Jacobson**Current Assessment:** Risk Rating 6 – Construction Risk

February 2015:

1. Slip lining brick sewers scheduled to begin After Chinese New Year. Prior to work commencement the risk owner is to meet with utility owner (PUC) and identify existing obstructions that are preventing slip lining work and request funding to relocate or eliminate obstructions.
2. 12 inch 100 year old water line identified as a risk. Prepare a conceptual waterline layout and present to utility owner (PUC) and request funding to upgrade their line.

March 2015

1. Slip lining between Washington and Jackson installed, backfilling on going. Determined that there would be no additional cost. Clay to Washington not yet scheduled.
2. No progress update for the 12-inch 100yr. old water line.

April 2015:

1. The 12inch/100 year old water line issue was addressed in the settlement report. No issues were found, the settlement report was not revised during the lowering of the tunnel.
2. The RE needs to drill down and investigate the issue. Are there additional precaution that need to be done?

May 2015:

1. A new valve was installed as part of the North Assess shaft 12 inch water line relocation. RE recommends that two Utility Monitoring points be installed at the junction of the old pipe and Washington St
2. RE should present his findings and recommendation to the Configuration Management Board as a proposed contract change. Or direct the Contractor to rearrange the utility monitoring points.

June 2015:

1. The 100 year old CIP 12" water line will be monitored.

Risk Mitigation Status

Risk Reference: 52

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Unacceptable settlement and impact on major utilities at CTS. (OLD SEWERS AND OTHERS WITHIN 20FT SPACE BETWEEN TOP OF CAVERN AND STREET LEVEL)	<ol style="list-style-type: none"> 1. Evaluate effect of potential settlement on utilities. 2. Slip-lined sewer by CTS contractor. 3. Other utilities will be reinforced as needed, monitored during construction, and repaired / replaced as needed. 4. Contractor to correct impact of settlements by repair. 5. Have contingency repair/restoration plan. 6. Utility contact information and procedure will be on plans. 7. Develop an allowance for utility repair. 8. Include probable costs in estimate.

Initial Assessment: 4, 2, 8

Risk Owner: D. Jacobson

Current Assessment: Risk Rating 6 – Construction Risk

June 2016:

1. At the current time, all utilities are currently functioning. Water utility monitoring is ongoing with Data Loggers that read decibel dB levels. The system (Gutermann Instruments data loggers with antennae) used for the TBM work is also appropriate for the SEM tunnel excavations for CTS Platform Tunnels. During the utility relocation effort, some data loggers went missing. SFMTA and the Instrumentation Task Force has required TPC to replace missing data loggers.
2. The Mitigation Strategy listed above probably needs to be updated. For example, most of item 2 is completed. Is item 7 relevant as the contract for CTS is already underway?

July 2016:

1. The Committee performed a reassessment of the risk, rating will remain a 6.

August 2016:

1. TPC’s subcontractor Exaro installed remaining Gutermann data loggers for total of 12 working loggers.
2. TPC installed piezometer using 4” drain pipe in the middle of the Wash/Stockton St intersection cistern on Tuesday, August 2, 2016. The cistern is filled with sand (in 1944, per as-built). Water level after pipe had been vacuumed out was 5.75’ below the street. With the sand and assumed void ratio, the cistern may hold 1000+ gallons of water.
3. SFMTA staff (RE and PM Eric Stassevitch) met with SFWater engineers and gatemen to plan emergency water shut off for CTS. Valve location plan and phone tree in case of an emergency are in process.

September 2016:

1. Water shut off work is not completed for the two emergency shutoff valves. Ongoing discussion with SFWater

October 2016:

1. Meeting with SFWater to proceed with installing two emergency gate valves, one 12” GV near Sta 108+00 on 100 yr-old 12” water and one 6” GV near Sta 100+50 near Jackson/Stockton intersection on 6” water line. SFWater completed hydraulic study to see how many of the dozen redundant gate valves can be closed in case of a major shutdown of water due to surface ground movement. So far, the

Risk Mitigation Status**Risk Reference: 52**

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Unacceptable settlement and impact on major utilities at CTS. (OLD SEWERS AND OTHERS WITHIN 20FT SPACE BETWEEN TOP OF CAVERN AND STREET LEVEL)	<ol style="list-style-type: none">1. Evaluate effect of potential settlement on utilities.2. Slip-lined sewer by CTS contractor.3. Other utilities will be reinforced as needed, monitored during construction, and repaired / replaced as needed.4. Contractor to correct impact of settlements by repair.5. Have contingency repair/restoration plan.6. Utility contact information and procedure will be on plans.7. Develop an allowance for utility repair.8. Include probable costs in estimate.

Initial Assessment: 4, 2, 8**Risk Owner:** D. Jacobson**Current Assessment:** Risk Rating 6 – Construction Risk

expected settlement of Stockton Street is much less than projected. Daily monitoring within the Cross-Cut Cavern is required during the Barrel Vault pipe installation.

Risk Mitigation Status
Risk Reference: 99

Risk	Mitigation Strategy
Breakdown in relationships between SFMTA and Contractors during construction results in increased claims and delays to the overall construction schedule.	<ol style="list-style-type: none"> 1. Executive partnering and alternate dispute resolution. 2. Train staff in adherence to issue resolution process

Initial Assessment: 5, 3, 8
Current Assessment: Risk Rating 5 – Construction Risk

Risk Owner: E. Stassevitch

Status Log:

February 2012 Meeting:

1. Mitigation measures being implemented.
2. Incentives not being used due to legal obstacles.
3. Recommend to reduce the risk rating.

December 2012:

1. The combined contract will reduce the number of interfaces between contracts and potential for relationships to become strained
2. The CMOD process is being improved for quicker resolution of change orders
3. Mitigation 2 - 'Provide incentives in construction contracts in addition to penalties' was removed from the mitigation strategy as this is not being used (as noted in the February 2012 update).

March 2013:

1. A breakdown in the relationship has occurred due to untimely resolution of changes and unresolved contract interpretation issues.
2. SFMTA CMod SWAT team dedicated to processing changes has been implemented to improve the performance of change processing.
3. This improvement has been recognized by both parties.
4. An issue resolution process has been formalized to address disputes and avoid claims.

April 2013:

1. The issue resolution process is not being followed consistently. BIH are not responding in a timely manner and are revisiting prior agreements in the issue resolution process.
2. Brian Kelleher is developing observations and training for adherence to issue resolution process.

May 2013:

1. New Issue Resolution Ladder process presented at the CMB

June 2013:

1. The first meeting was held with BIH on May 21st, 2013 utilizing the refined issue resolution process that was presented to the CMB in May with positive results. A follow up meeting is being held June 14th to further refine the process.
2. Staff training in the issue resolution process is ongoing.
3. A similar meeting with Tutor Perini will be held in future.

Risk Mitigation Status	
Risk Reference: 99	
Risk	Mitigation Strategy
Breakdown in relationships between SFMTA and Contractors during construction results in increased claims and delays to the overall construction schedule.	<ol style="list-style-type: none"> 1. Executive partnering and alternate dispute resolution. 2. Train staff in adherence to issue resolution process

October 2013:

1. Issue resolution ladder is not working as intended and is to be discussed at the next partnering session

November 2013:

1. Issue resolution ladder to be discussed at next partnering meeting to be held 11/18/13.
2. Risk rating reduced as relationship with 1252 Contractor has improved
3. Risk rating reduced to 5. Probability (2) 10-50%, Cost Impact (4) \$3m-\$10m, Schedule Impact (1) < 1 month.
- 4.

December 2013:

1. IRL process topic of discussion during Partnering. Contractor has agreed to focus more efforts to resolve issues.

March 2014:

1. Executive Partnering session with Contractor for 1300 (TPC) was held 27JAN14. Follow-up dedicated meeting for the schedule brainstorming was calendared for the 28FEB14 but subsequently cancelled by TPC. Currently not rescheduled
2. Regular quarterly partnering meeting held with 1252 Contractor (BIH). Openly discussed contentious environment between parties and how to improve. Executive management team committed to process moving forward, established follow-up dates to review schedule recovery, retention reduction and release, and timely processing of progress payments.

April 2014:

1. The next Executive partnering meeting is schedule with the Contractor for (1300) Tutor Perini on April 24, 2014
2. An Executive Management meeting was held with between contract 1252 and the PM/CM Sr. Management to resolve outstanding COR's. A follow up meeting to discuss the balance of the issues is scheduled for 04/15.
3. Construction Management team for contract 1300 will be trained in adherence to issue resolution process.

May 2014:

1. SFMTA and Tutor Perini have had 2 Exec partnering sessions.
2. Practices are being implemented to address issues.

December 2014:

1. Quarterly Partnering meetings are taking place to address issues.

August 2015:

1. An executive partnering session meeting is schedule between SFMTA and TPC's upper management on August 27, 2015 at 10am.

Risk Mitigation Status
Risk Reference: 99

Risk	Mitigation Strategy
Breakdown in relationships between SFMTA and Contractors during construction results in increased claims and delays to the overall construction schedule.	<ol style="list-style-type: none"> 1. Executive partnering and alternate dispute resolution. 2. Train staff in adherence to issue resolution process

November 2015:

1. As part of an overall evaluation of the remaining requirement and design risk, as well as the low rated active construction risk. The committee performed a reassessment of this risk to determine if its current Risk rating is still valid.
2. There was no change made to the risk rating. This construction Risk rating will remain a 5.

April 2016:

1. Meetings are taking place with TPC's management every Thursday at 1:30pm. The RE's also attend a progress meeting each Tuesday and Wednesday's with a number of TPC management.

May 2016:

1. In an effort to resolve any issues meetings between SFMTA and the Contractor are ongoing.

June 2016:

1. Weekly meetings with REs and Project Engineers for TPC together with Executive Weekly meetings continue to be held to improve communications and address issues. Focus will continue to be on resolving disputes at the lowest possible level.

July 2016:

1. Executive Weekly meetings are ongoing. Recently the project conducted a Partnering meeting on June 24th, as well a DRB meeting.
2. The Committee performed a reassessment of the risk, rating will remain a 5.

October 2016:

1. Executive Partnering session with the 1300 Contractor was held on September 8, 2016.
2. Weekly meetings are taking place with SFMTA's RE's, Program Management and TPC's management and Project Engineers.

Risk Mitigation Status
Risk Reference: 103

Risk	Mitigation Strategy
Difficulty in getting required permits.	<ol style="list-style-type: none"> 1. Coordinate with permit officials and request permits as early as possible. 2. Obtain assistance obtaining permits from PM/CM & FD Consultants.

Initial Assessment: 1, 1.5, 2
Current Assessment: Risk Rating 2 – Construction Risk

Risk Owner: A. Clifford

Status Log:

December 2012:

1. Monthly meetings are being held between the 3rd Party team and design oversight managers to discuss the permitting requirements of each contract and provide a status of procurement of the required permits.
2. A Permit matrix has been developed to track the progress of the permits being sought for the program.

April 2013:

1. Permit applications are being submitted as early as possible
2. Central Subway are working with DBI to close out remaining issues for issuance of DBI Building permit prior to NTP
3. Central subway are working with DPW to obtain an 'overall excavation permit' for each work area (CTS, UMS, YBM, STS) to reduce the risk of delay to the 1300 contractor obtaining excavation permits.

October 2013:

1. Building and demolition permits have been issued
2. Outstanding permits and needed dates are being tracked weekly
3. No change to the status of this risk

June 2014:

1. General Excavation Permits were obtained for the 1300 Contract and have been issued to Tutor Perini.
2. Other remaining permits are being tracked weekly.
3. No change to the status of this risk.

November 2015:

1. There are still outstanding permits to be acquired, including Caltrans permits.

December 2015:

1. Caltrans Permit is still outstanding for items to be permanently installed for the 1256 'STS' scope of work.
 - a. The project team is compiling the required documents and completing the new application.
2. The STS RE is procuring an interim encroachment permit to enable work in the field to continue.

Risk Mitigation Status

Risk Reference: 103

Risk	Mitigation Strategy
Difficulty in getting required permits.	<ol style="list-style-type: none">1. Coordinate with permit officials and request permits as early as possible.2. Obtain assistance obtaining permits from PM/CM & FD Consultants.

January 2016:

1. Post meeting update: The RE for STS confirmed Caltrans interim encroachment permit for STS to perform work in the Caltrans yard, installing various items has yet to be acquired.

February 2016:

1. The STS RE has procured an interim encroachment permit to enable the work to continue.
2. Staff is preparing the new permanent encroachment permit application for submittal to Caltrans.

July 2016:

1. One Caltrans permit is still pending for STS.
2. The Committee performed a reassessment of the risk, rating will remain a 2.

October 2016:

1. SFMTA is working with Sustainable Streets on installation of traffic signal boxes in Caltrans right away.

Risk Mitigation Status
Risk Reference: 205

Risk		Mitigation Strategy
Prolong period of CMod's creates additional cost/causes bad blood between Resident Engineer and Contractor	<ul style="list-style-type: none"> √ √ 	<ul style="list-style-type: none"> 1. CMod Task Force - 5 Areas of Improvement identified 2. Implement areas of improvement 3. Increase Delegation of Authority

Initial Assessment: 1, 1, 3
Current Assessment: Risk Rating 3 – Construction Risk

Risk Owner: E. Stassevitch

Status Log:

December Meeting 2012:

- 1. Identified Risk and refined risk statement together with development of mitigation strategies.

January 2013:

- 1. CMod Task force continues to demonstrate the process is working.
- 2. Task force process has slowed down submission of changes from Contractor

February 2013 Meeting:

- 1. Initial risk rating established
- 2. CMod task force improvements are working
- 3. The combined 1300 contract has effectively resulted in a \$5m Board threshold for the entire 1300 contract (previously \$5m threshold for each of the 4 contracts) – Central Subway to investigate increasing the CMod authority above \$5m.

March 2013:

- 1. Process to increase delegation of authority to be discussed

April 2013:

- 1. Risk owner changed from M. Benson to R. Redmond
- 2. A formal recommendation to increase the delegation of authority will be prepared and presented to the CMB on 4/17.
- 3. A detailed White Paper will be developed for the Project Director outlining the rationale for increasing the delegation of authority.

May 2013:

- 1. A request to the SFMTA board to increase the Director of Transportation authority to approve changes orders of up to \$5 million for each of the Contract 1300 packages (a total of \$20 million) has been included in the calendar item requesting the SFMTA board to award Contract 1300.
- 2. The target SFMTA board meeting for this calendar item is May 21st 2013.

October 2013:

- 1. SFMTA board approved increase in Directors authority with award of Contract 1300 in May 2013.

Risk Mitigation Status
Risk Reference: 205

Risk		Mitigation Strategy
Prolong period of CMod's creates additional cost/causes bad blood between Resident Engineer and Contractor	<ul style="list-style-type: none"> √ √ 	<ul style="list-style-type: none"> 1. CMod Task Force - 5 Areas of Improvement identified 2. Implement areas of improvement 3. Increase Delegation of Authority

May 2014:

- 1. Progress in the CMod process are continuing to be made.

July 2014:

- 1. Contract 1300 Partnering efforts have expanded to include the RE level, Designers, Utility companies and Department of Traffic.

December 2014:

- 1. No change to the status of this risk.

September 2015:

- 1. Executive partnering meeting on August 27, 2015 established goal to lower number of outstanding merited changes. Focused attention on completing outstanding merit evaluations, and effectively utilizing the regular weekly meeting to move changes thru the process. Program Manager and Contractor Project Manager to attend weekly change meeting to prioritize work and to meet more often if required expediting processing of changes. Progress to be monitored weekly to measure effectiveness and implement mitigations as required.

October 2015:

- 1. Weekly Change Management meetings are beginning to produce results; agreed to list of changes, prioritization of items to be addressed, and scheduling of change negotiations. Progress is still extremely slow in the processing of agreed to changes, but moving forward.
- 2. Outstanding merit determination items are being reduced.

November 2015:

- 1. Progress continues to be extremely slow, but still moving forward.

December 2015:

- 1. Three Cmod's have been signed this month, that contained multiple COR's.

January 2016:

- 1. 6 more Cmod's have been processed since the last update, all contain multiple CORs.

February 2016:

- 2. Four CMods for the stations contract and Two CMods for the tunnel contract have been process since last month's update.

April 2016:

- 1. The change order process is being examined. The Program has brought on additional help to address the issue of assessing merit determination at UMS – Union Square Garage settlements.

Risk Mitigation Status
Risk Reference: 205

Risk		Mitigation Strategy
Prolong period of CMod's creates additional cost/causes bad blood between Resident Engineer and Contractor	<ul style="list-style-type: none"> √ √ 	<ul style="list-style-type: none"> 1. CMod Task Force - 5 Areas of Improvement identified 2. Implement areas of improvement 3. Increase Delegation of Authority

May 2016:

1. The change order process is being examined by SFMTA Project Manager - Contract Administration, to identify the constraints of lump sum proposals. Solutions being proposed are to process unilateral changes when cost is not negotiated.
2. The Program is looking at ways or a process to determine distinctively how to pay the Contractor.

June 2016:

1. Continued Efforts to examine the CMod process in order to identify area that require improvement to reduce the time it takes to process changes.

July 2016:

1. The Committee performed a reassessment of the risk, rating will remain a 3.

August 2016":

1. Progress is being made towards reducing the time it takes to process contract change modifications. Work still needs to be made toward increasing the time it takes to receive signature approval from all parties.

September 2016:

1. The Program processed and signed six CMod's this month. Work still needs to be done to improve the time it takes in establishing merit and quantum.

October 2016:

1. Progress in the CMod process are continuing to be made. Improvements still need to be made in the time it takes for RE's to establish merit and quantum.

Risk Mitigation Status
Risk Reference: 229

Risk	Mitigation Strategy
CN1300 System Acceptance Testing	1. Identify duration

Initial Assessment: 3, 1, 3
Current Assessment: Risk Rating 6 – Construction Risk

Risk Owner: A. Hoe

Status Log:

- November 2014:
1. Risk needs to be further evaluated to gain a better understanding of what mitigation strategies need to be implemented.
- August 2016:
1. Individual system components may take longer than expected.
- September 2016:
1. Currently the Program is working towards putting together system schedule to identify all the key components.
- October 2016:
1. The train control system schedule is being developed and will be included as part of the as built schedule.

Risk Mitigation Status

Risk Reference: 230

Risk	Mitigation Strategy
SFMTA Commissioning Coordination	<ol style="list-style-type: none">1. Signage – Notifying the public2. Create a commissioning team3. Getting Operation’s test requirement in hand

Initial Assessment: 3, 1, 3

Risk Owner: A. Hoe

Current Assessment: Risk Rating 6 – Construction Risk

Status Log:

November 2014:

1. Risk needs to be further evaluated to gain a better understanding of what mitigation strategies need to be implemented.

August 2016:

1. During commissioning, test performed by TPC will need to be witness by Operations. SFMTA will need to confirm which test and the amount expected to be witnessed.

September 2016:

1. SFMTA is developing the Rail Activation Plan (RAP). The RAP will establish dates when activities need to take place and will be added to the schedule for startup and testing.

October 2016:

1. No status update for this month. The Rail Activation Plan (RAP) is continuing to be developed.

Risk Mitigation Status
Risk Reference: 232

Risk	Mitigation Strategy
Behind Schedule - Unable to Recover from Delay to 1300 Contract	<ol style="list-style-type: none"> 1. Contractor implemented Schedule Recovery 2. Acceleration 3. Scope Reduction

Initial Assessment: 4, 3, 3
Current Assessment: Risk Rating 12 – Construction Risk

Risk Owner: E. Stassevitch

Status Log:

January 2015:

1. Contractor’s schedule update has not been submitted.

February 2015:

1. Contractor has submitted their schedule update on February 04, 2015. The update shows an approximate six month delay. A time impact analysis has not been submitted to justify this claim.
2. To pick up time, the Contractor should be put on notice that activities on the schedule which the Contractor can work two shifts, they should do so.
3. SFMTA needs to perform an in-house analysis on the schedule.

March 2015:

1. SFMTA will perform an in-house analysis of the Contractor’s time impacts submitted to validate the actual durations.
2. SFMTA will meet with the PMOC to discuss activities on the Contractor’s schedule for ways to gain recovery.

April 2015:

1. A draft analysis was done to compare the Contractor’s baseline activities against actual work which occurred in January update.
2. Additional analyses will be ran to demonstrate a side by side comparison for each delay the Contractor is claiming.
3. A standardize document will be created for reporting the Contractor’s work progress versus what is shown in the baseline schedule activity.

May 2015

1. The Program will initiate a schedule containment workshop, to better define the risk to the project, and address issues and ways to mitigate potential delays.

June 2015:

1. A schedule analysis being generated to determine the number of days the contractor is behind schedule.

July 2015:

1. Schedule analysis continues to be generated to determine precise number of days the contractor is behind
2. Partnering workshop held – mini milestones identified to increase confidence that team can attain schedule recovery.

Risk Mitigation Status
Risk Reference: 232

Risk	Mitigation Strategy
Behind Schedule - Unable to Recover from Delay to 1300 Contract	<ol style="list-style-type: none"> 1. Contractor implemented Schedule Recovery 2. Acceleration 3. Scope Reduction

August 2015:

1. Schedule updates are being received from the Contractor. Once all updates are received and approved, the Program can proceed with making a determination of the amount of time the Contractor is behind schedule and begin to work on ways to mitigate the delay.

September 2015:

1. Executive Partnering meeting held August 27, 2015, established initial recovery efforts to double shift roof placement activities at UMS to recover lost time from jet grouting operations; also identify any and all work to could be performed now, and implement plan to proceed with that work. Initial ideas identified work in the tunnel. Tunnel walk thru by Contractor took place on September 2, 2015, with effected subcontractors, to develop plan for placing as much tunnel invert as possible prior to break-ins.

October 2015:

1. Work is proceeding with the extended shifts for the roof placements; goal is to complete all but two of them by the moratorium.
2. Work in the tunnel is progressing with removal of the fan line (ducts) and preparation for invert placement. Goal is to complete all invert and rail placement by April 2016 working from North to South.

November 2015:

1. Continuing with efforts to complete roof placements, will not achieve goal of all but two. Need to develop plan for after moratorium to make up lost time on roof placement efforts.
2. Work in the tunnels continues, all fan line removed. Still on track to complete goal by April 2016. Response required for shrinkage crack RFI

December 2015:

1. A schedule workshop meeting took place on 11/18 and 11/19 to see where there was opportunity to recovery.
2. A Senior Management meeting will take place to discuss ways to implement some of the schedule recovery elements.

January 2016:

1. Sr. Mgmt meeting took place Dec 4th, identified CTS as critical path and reviewed areas to potentially recover time or at a minimum not to lose more time. Identified 5 mini milestones to track to ensure progress is maintained or improved. Focus is on having all barrel vaults installed by 23rd of Feb and CDF in tunnels in place ready for break in of Cross cavern.

February 2016:

1. Modification of the mini milestones identified at CTS was done. The Contractor is still working towards the new dates.

Risk Mitigation Status
Risk Reference: 232

Risk	Mitigation Strategy
Behind Schedule - Unable to Recover from Delay to 1300 Contract	<ol style="list-style-type: none"> 1. Contractor implemented Schedule Recovery 2. Acceleration 3. Scope Reduction

April 2016:

1. TPC Management is very focus on insuring that the schedule is recovered to the best of everyone's ability and identify components of work that will allow the contract to recovery time. The primary focus currently is on the Chinatown stations. As an example the audacious goals were established for all four work sites during partnering. CTS goal is to complete the cross cut cavern by June 15th, 2016. This would be a month to 1-1/2 months ahead of schedule. Additionally, short-term milestones are also being tracked.
2. SFMTA has created a progress schedule to use as a tool to help update the Contractors schedule in areas where there is a disagreement.

May 2016:

1. Correction from last month's update: *CTS goal is to complete the cross cut cavern by July12th, 2016.*
2. SFMTA and TPC continue to work towards reconciling the progress schedule.

June 2016:

1. Continue to focus on CTS goal to complete cut cavern by July 12, 2016.

July 2016

1. The Committee performed a reassessment of the risk, rating will remain a 12.

August 2016:

1. The Program is addressing the Contractor's TIA's, however have yet to received supporting documentation to justify their time impact claims.

September 2016:

1. The PCC team is working on the as built schedule. The Program anticipates having the knowledge of who owns the delay by November.

October 2016:

1. Work continues by the Project's Cost Control team towards the goal to have the as-built schedule completed by the beginning of November.

Risk Mitigation Status
Risk Reference: 233

Risk	Mitigation Strategy
Acceptance of Shotcrete Substitution - leads to final product being inferior in performance	1. Meet and discuss with TPC's senior management what the issues are and the status for clarification.

Initial Assessment: 3, 3, 3
Current Assessment: Risk Rating 9 – Construction

Risk Owner: D. Jacobson

Status Log:

December 2014:

1. SFMTA and TPC have a different interpretation of the contract specification language for where shotcrete may be used for the final lining of the Cross Cut, Platform and Crossover Covers at CTS in the tunnel lining.

January 2015:

1. The Program received a resubmittal of the shotcrete plan. The new submittal deletes the phrase “in lieu of”. Allowing the content of the submittal to be reviewed as a mix design for shotcrete.

February 2015:

1. CSDG has been authorized to review the shotcrete resubmittal.

March 2015:

1. Receipt of the Contractor's response to SFMTA letter CS CN 1300 No. 0556 requesting the Contractor demonstrate in his submittal how the performance specifications will be met for concrete by using the shotcrete is still pending.

April 2015:

1. The Contractor has yet to respond to SFMTA's request to demonstrate performance criteria will be met.

May 2015

1. The contractor has yet to respond.

June 2015

1. Contractor has yet to submit.
2. Risk title was reevaluated for accuracy of the risk. The Risk Committee agreed the title should be changed during the June 2015 meeting.

July 2015:

1. TPC announced at the Partnering meeting they are working on the submittal demonstrating the performance requirement.

Risk Mitigation Status
Risk Reference: 233

Risk	Mitigation Strategy
Acceptance of Shotcrete Substitution - leads to final product being inferior in performance	1. Meet and discuss with TPC's senior management what the issues are and the status for clarification.

August 2015:

1. No submittal received, TPC has informed us that they will submit two separate submittals. One for the head house and one for the underground station, crossover and cross cut. The use of shotcrete as a final lining is over a year off

September 2015:

1. Nothing submitted yet.
2. The Contractor indicated during the Partnering meeting on 08/27/15, they are working on it.

October 2015:

1. We have not received the submittal. The issue is thought to be concerning the Contractor proposing sacrificing the waterproofing membrane in front.

November 2015:

1. The Program has expressed concern with the Contractor wanting to piecemeal approach of submitting information related to shotcreting work, which gives the false impression the Program is accepting their proposal of shotcrete in lieu of. SFMTA will send a letter to the Contractor rejecting their submittals ideals (Shotcrete in lieu of). Requesting a more comprehensive submittal package demonstrating they are meeting all of the performance requirements.

December 2015:

1. TPC submitted Letter -1166 with 5 exhibits responding to SFMTA letters 556 and 1039. The letter is under review. Shotcrete mix design has been approved and test panels are scheduled to be shot.

January 2016:

1. SFMTA has yet to respond to TPC letter No. 1166. SFMTA is in the process of responding. The letter will address the issue of deficiency. Citing directly from the contract technical specifications.

February 2016:

1. SFMTA has met with CSDG to resolve if a redesign of the final lining is required, awaiting a response from CSDG. Met with TPC and their shotcrete subcontractor Superior regarding response to Letter 556, it became clear that the 556 deals only with vertical walls in the stations. The CTS caverns will be dealt with later. Working on response.

March 2016:

1. SFMTA, Designer, Contractor and Specialty Contractor have all agreed on the configuration for vertical shotcrete of what the test panels will consist of. The panels will replicate the most congested condition which could be found on the jobsite.

Risk Mitigation Status
Risk Reference: 233

Risk	Mitigation Strategy
Acceptance of Shotcrete Substitution - leads to final product being inferior in performance	1. Meet and discuss with TPC's senior management what the issues are and the status for clarification.

2. The cavern concrete issue has not been decided yet.

April 2016:

1. The four test panels were shot will soon be examine to determine if approval may be given. The panel shot is a god representation of the worse conditions that may be found.
2. CSP suggested that TPC put in writing that they are agreeable to shooting another test panel if a worse condition is presented.

May 2016

1. Vertical shotcrete appears to be working well in cases where the extent of reinforcement is less than #6 rebar and is mostly WWF.
2. Shotcrete for the cavern remains an issue to address with TPC, especially,
 - a. How will TPC determine that the primary lining does not encroach into the final lining?
 - b. How many layers of rebar and diameter of rebar are part of final lining?
 - c. How will TPC determine that the final face of concrete is to the proper contour?
 - d. TPC will need to provide a detailed description of the process of application to insure no shadowing, that rebar does not pull away from the exact position within final lining.

June 2016:

1. Shotcrete for the cavern remains an issue to address with TPC, especially,
 - a. How will TPC determine that the primary lining does not encroach into the final lining?
 - b. How many layers of rebar and diameter of rebar are part of final lining?
 - c. How will TPC determine that the final face of concrete is to the proper contour?
 - d. TPC will need to provide a detailed description of the process of application to insure no shadowing and that rebar does not pull away from the exact position within final lining.

July 2016:

1. The Committee performed a reassessment of the risk, rating will remain a 9.
- 2.

August 2016:

1. Review of shotcrete for Final Lining continues with RE (Doug) working with PB and DSG on proper and informed response.

September 2016:

1. RE (Doug) prepared letter to TPC informing them SFMTA has not received any further information on their proposed substitution of Shotcrete in lieu of Cast-In-Place final lining. Doug has 10 major issues that have yet to be addressed by TPC. These include redesign of waterproofing, redesign of rebar, shadowing-inadequate rebar coverage, construction joint water seal, and effect to schedule. Also, this proposed design was used in NYC by Superior Gunite and resulted in leaks through the final lining that have caused slip-and-fall injuries to passengers using the underground station.

Risk Mitigation Status**Risk Reference: 233**

Risk	Mitigation Strategy
Acceptance of Shotcrete Substitution - leads to final product being inferior in performance	1. Meet and discuss with TPC's senior management what the issues are and the status for clarification.

October 2016:

1. TPC sent Letter 2187 on Sept 22, 2016 discussing their plans for final shotcrete lining in lieu of Cast-in-Place (CIP). TPC made PowerPoint presentation on October 4, 2016. TPC has still not submitted thorough design elements that can be reviewed, let alone be approved. TPC continues to refuse to submit Substitution Request for their proposed change to Contract requirements. After 23 months, resolution of this issue has not moved an inch. TPC continues to refuse to submit plans for CIP formwork in case that their proposed "Substitution" is denied. This could have severe consequences to meeting Critical Path Schedule and opening of the Central Subway.
2. This RE (Doug Jacobson) considers the risk level HIGH for this issue, both in meeting schedule and meeting water-tightness of the final Platform Cavern.

Risk Mitigation Status
Risk Reference: 234

Risk	Mitigation Strategy
Sequential Excavation Method at CTS - Contractor's propose method will induce subsidence	<ol style="list-style-type: none"> 1. Designers concurrence on variation of options 2. Presented four options to the Contractor for going forward

Initial Assessment: 2, 4, 3
Current Assessment: Risk Rating 7 – Construction Risk

Risk Owner: D. Jacobson

Status Log:

January 2015:

1. The Program is awaiting the Contractor's SEM re-submittal. Anticipating their response to SFMTA's letter providing them with 4 options to choose from to perform the work.

February 2015:

1. No new update on this risk.

March 2015:

1. Contractor has yet to submit a response to SFMTA letter providing them with alternatives for the excavation sequences.

April 2015:

1. Contractor has not responded to SFMTA's letter with alternatives
2. The Designer of record will be contracted to review the Contractor's submittal for (scope and delivery) to determine if the proposed is viable.

May 2015:

1. The designer has proposed 4 different sequences for the contractor to evaluate. Contractor is evaluating.
2. DOR was compensated to review the SEM Geometry change and offered suggestions for TPC's evaluation.

June 2015:

1. Contractor has yet to submit.
2. Risk title was reevaluated for accuracy of the risk. The Risk Committee agreed the title should be changed during the June 2015 meeting.

July 2015:

1. Contractor has yet to submit.

Risk Mitigation Status
Risk Reference: 234

Risk	Mitigation Strategy
Sequential Excavation Method at CTS - Contractor's propose method will induce subsidence	<ol style="list-style-type: none"> 1. Designers concurrence on variation of options 2. Presented four options to the Contractor for going forward

August 2015:

1. Contractor has yet to submit.

September 2015:

1. The Contractor has submitted the proposed method. The submittal was forwarded to the designer of record on July 29 and is now being reviewed by CSDG.

October 2015:

1. The submittal was returned revise and resubmit. The designer did not have an issue with the proposed sequences but wanted to see the stamped calculations.

November 2015:

1. The Contractor is performing the work in the approved prescribed sequence. Stamp calculations have yet to be submitted.

December 2015:

1. A contractor is performing the prep work in the approved prescribed sequence. Calculations were not required for the sequence. Calculations were required for slurrywall support between the two side drifts.

January 2016:

1. The Contractor is performing the prep work as prescribed.
2. The risk to the Program is can they perform the work in a quality manner.

February 2016:

1. TPC is performing the work as specified.

April 2016:

1. The Contractor is in the process of installing barrel vault pipes.
2. The SEM designer of record Engineer Franz Langer is now on site to ensure the contract design is being followed.

May 2016:

1. Barrel vault pipes are installed and grouted.
2. SEM support team with additional geologist and one of two QA inspectors are on site. Second QA inspector due within one week.
3. Two horizontal inclinometer are not working as of this morning.
4. Contractor (TPC – FKCI) has begun mining operation. SFMTA sent letter yesterday citing TPC for failure to comply with contract on required functioning instrumentation prior to beginning excavation.

Risk Mitigation Status
Risk Reference: 234

Risk	Mitigation Strategy
Sequential Excavation Method at CTS - Contractor's propose method will induce subsidence	<ol style="list-style-type: none"> 1. Designers concurrence on variation of options 2. Presented four options to the Contractor for going forward

June 2016:

1. Barrel vault pipes and grouting continues to provide support as planned
2. SFMTA's SEM Team (Dr. Sauer Group - DSG) has four men on site, Franz Langer, lead engineer for SEM; Michael Orisario, geologist engineer; Arno and Walter – day/night shift SEM inspectors.
3. All three horizontal inclinometers are now working as necessary from monitoring subsidence immediately above the tunnel excavation.
4. Wang Technologies staff continues to take surface readings above the tunnel excavation twice a week with data reviewed by both SFMTA and TPC teams.
5. Daily readings of Convergence targets (four of six sets of three) are provided as work progresses. Settlement so far for the sidedrifts has remained under 5 mm.

July 2016:

1. The Committee performed a reassessment of the risk, rating will remain a 7.

August 2016:

1. No change from June 2016 assessment.

September 2016:

1. No change to five items listed for June 2016. Frontier-Kemper continues mining on Cross Cut Cavern - Left and Right Side Drift Benches and Inverts. Final section is Center Drift Bench and Invert to complete the ring closure for the CCC. Dr. Sauer & Partners expect up to 10 mm settlement in the street once the ring is closed. Bi-weekly monitoring continues to show stability.

October 2016:

1. Basically, no change to five items for June 2016. F-K completed CCC and NEET on October 6.
2. DSP has four men working on excavation/support phase of CCC through Oct 8. Crew shrinks to three during the next 5-6 week phase of Barrel Vault drilling, installation, grouting, probably completed mid-to-late November based on discussion with DSP (FL).
3. Inclinometers worked through completion of CCC.
4. Wang Tech continues with twice-a-week measurements of surface points with no alerts or triggers yet.
5. Convergence points within the CCC indicated that the beginning and ending points (Stations TM 4.0-6.0, TM 66-68, TM 78) exhibited less than 5 mm movement. Center survey points (Sta. TM 34-36) converged or settled under 10 mm movement, less than expected.
6. Stability for the CCC is quite good. Now next phase begins of backfilling up to Springline and "crunching" temporary inner arches to begin Barrel Vault installation (59 pipes for each of the North Platform and South Platform tunnels).

Risk Mitigation Status
Risk Reference: 238

Risk	Mitigation Strategy
Quality Program is ineffective in processing the nonconformance items causing schedule impacts	<ol style="list-style-type: none"> 1. Review CNCR log on a biweekly basis. 2. Greater clarity in the Log on what CNCR's are open

Initial Assessment: 3, 2, 2
Current Assessment: Risk Rating 6 - Construction

Risk Owner: M. Latch

Status Log:

July 2015:

1. Discussion required regarding condemning the "Quality Program" VS TPC/TPC QC's inability to; accurately log and or expedite the determination of the disposition of a CNCR, provide timely suggested repair procedures, determine root cause, provide acceptable steps to prevent recurrence, correctly close or accurately update the CNCR Log .
2. TPC QC has begun using the CM13 module for Noncompliance Notices for CNCRs. This should provide for timely submittal of CNCRs and timely/accurate updates of the CNCR Log. More to follow.

August 2015:

1. Assessment of the risk was done and values were assigned.
2. **Recommended risk rating 6 (3 2 2)**
 - a. Probability (3), >50%
 - b. Cost impact (2), <>\$250K - \$1M
 - c. Schedule impacts (2), <> 1 - 3 Months

September 2015:

1. SFMTA Construction team diligently working to make sure the CNCR log is accurate and nonconformance items are being clearly addressed

October 2015:

1. As mentioned in the 6Oct2015 C1300 Progress Meeting - TPC QC has made significant progress in providing a more complete, accurate and timely CNCR Log.
2. New mitigation item added.

November 2015:

1. TPC QC, with support from TPC's Project Executive, is no longer allowing commercial issues to impede the generation of CNCRs.
 - a. Additionally, at the bi-weekly Quality Task Force Meeting it was agreed that TPC's CQM and the CSP PQM will discuss CNCRs that are of a particularly contemptuous or controversial nature and in particular to make sure that each CNCR is timely and accurate and describes non-conforming work; not contractual matters. CNCRs are now identified on the CNCR Log and at each Additional Initial Phase Concrete Pre-Placement Meeting, to preclude work that is the subject of a CNCR from being inadvertently

Risk Mitigation Status	
Risk Reference: 238	
Risk	Mitigation Strategy
Quality Program is ineffective in processing the nonconformance items causing schedule impacts	<ol style="list-style-type: none"> 1. Review CNCR log on a biweekly basis. 2. Greater clarity in the Log on what CNCR's are open

incorporated in to the work. TPC in general, is providing a timelier but still in need of improvement (including ensuring that sufficient information is provided to the Engineer to allow an efficient review of each CNCR) disposition of CNCRs. TPC QCM is now signing off on each CNCR form, prior to the submittal to the Engineer, attesting to the fact that the CNCR contains a reasonable/plausible root cause, suggested repair, reason for accepting a USE-AS-IS dispositioned CNCR and steps to preclude recurrence.

- b. Posting all CNCRs to CM13 eliminates issues associated with the lack of CNCR file naming convention or human error. Through the use of CM13, the Initial issuances and subsequent processing of CNCRs are now timelier and much easier to retrieve for review/approval/informational purposes. Each of the four stages/phases of each CNCR are documented by posting (attaching) a separate file for (1) Initial, (2) Dispositioned, (3) Approved by SFMTA (REPAIR and USE-AS-IS dispositions) and (4) Closed CNCRs, to the associated CNCR number within CM13.

January 2016:

- 1. The posting of nonconformance items by the Contractor has shown notable improvements as it relates to the four stages/phases within CM13.

February 2016:

- 1. Timely issuance/updating of TPC's CNCR log and issuance of initial phase CNCRs has significantly improved.

March 2016:

- 1. Nothing new to report other than the CNCR Log is distributed, and discussed as warranted, at the weekly Contract Package Progress Meetings. And, SFMTA Quality Assurance Audit QAS 026, currently being conducted, includes CNCR Log attributes.)

April 2016:

- 1. Nothing new to report.

May 2016:

- 1. As mentioned for Risk 237, weekly review of CNCRs at each Work Package Progress Meeting indicates that TPC, in conjunction with the Resident Engineers, is satisfactorily implementing the CNCR process otherwise nothing new to report.

June 2016:

- 1. CNCRs continue to be processed by TPC QC as required. One item to note is that the log includes "What is Affected" – this is where each concrete Lift that is impacted/affected by a CNCR is clearly indicated such that concrete is not placed until all non-conforming conditions have been rectified.

July 2016:

Risk Mitigation Status**Risk Reference: 238**

Risk	Mitigation Strategy
Quality Program is ineffective in processing the nonconformance items causing schedule impacts	<ol style="list-style-type: none">1. Review CNCR log on a biweekly basis.2. Greater clarity in the Log on what CNCR's are open

1. As reported last month; CNCRs are being logged, generated and processed as required.
2. The Committee performed a reassessment of the risk, rating will remain a 6.

August 2016:

1. No change in status since July 2016.

September 2016:

1. SFMTA and TPC continue to coordinate efforts to mitigate the risk.

October 2016:

1. TPC QC continues to generate "initial" CNCRs upon becoming aware (which often is provided by SFMTA) of a probable non-conformance. CNCRs are then logged and suitably dispositioned, approved by the appropriate entities and closed as appropriate. As has been mentioned previously, weekly progress meetings for each of the Contract Packages includes an agenda item for Quality that always includes a discussion related to CNCRs. Currently, CNCRs are usually being written in a timely manner and are processed as required.

Risk Mitigation Status
Risk Reference: 240

Risk	Mitigation Strategy
Unresolved Assignment of Schedule Delay Responsibility (may lead to increase cost for the Program)	1. Ask for TIA's 2. As Built Schedule (Program Analysis) 3. Perform a more refined analysis

Initial Assessment: 2, 4, 4 **Risk Owner:** E. Stassevitch
Current Assessment: Risk Rating 8 – Construction Risk

Status Log:

- October 2015:
1. Risk was assessed, risk rating was applied and mitigation strategy added.
 2. SFMTA requested the Contractor to submit a recover schedule to demonstrate the method to which they intend to capture the time loss. If the Contractor elects not to produce a recovery schedule. The Program should formally document the Contractor is not adhering to the contract.
- November 2015:
1. SFMTA is working with Contractor to produce recovery Schedule.
 2. SFMTA together with FTA PMOC have planned a schedule workshop for mid Nov. to focus on identifying recovery plans and addressing several issues with the schedule update process.
- December 2015:
1. Working with TPC to provide monthly schedule progress updates to minimize impact.
- January 2016:
1. Schedule letter in preparation to address issues surrounding schedule updates, need for schedule recovery plan, and other deficiencies related to contract required schedule deliverables.
- February 2016:
1. SFMTA is preparing a letter to be sent out on February 5, 2016. The will address various issues:
 - a. TPC's claim of TIA's, which have yet to be received by SFMTA.
 - b. List of achievable goals where SFMTA can help them with.
- April 2016:
1. Partnering with TPC continues. Both parties have agreed to sit down and discuss schedule comments.
 2. Limiting the rhetoric, comments are required to come from management in terms of how to address the schedule mitigation.
 3. The work is not being by the unresolved schedule comments. The focus now is to improve the contract operation future and to reconcile the past.
 4. Two additional resources on the SFMTA's scheduling side have been brought on board help with resolutions.

Risk Mitigation Status
Risk Reference: 240

Risk	Mitigation Strategy
Unresolved Assignment of Schedule Delay Responsibility (may lead to increase cost for the Program)	<ol style="list-style-type: none"> 1. Ask for TIA's 2. As Built Schedule (Program Analysis) 3. Perform a more refined analysis

May 2016:

1. Reconciling of the progress schedule continues.
2. The SFMTA's goal is to have the as built schedule reconciled by the end of May. Source data will be transmitted to TPC to show why schedule dates were changed by SFMTA.

June 2016

1. SFMTA continue to work on As-built schedules reconciliation,
2. Progress schedule reconciliation continues

July 2016:

1. The Committee performed a reassessment of the risk, rating will remain an 8.

August 2016:

1. SFMTA continues to work with TPC to reconcile the progress schedule. Pressing TPC to address issues related to logic and other issues.

September 2016:

1. To mitigate the delays the Contractor will work towards reducing the amount of work, which needs to be completed in the remaining amount of time.
2. The Program have buffer float of about six months.

October 2016:

1. Efforts are ongoing towards completing the as built schedule as well as reconciling the progress schedule.

Risk Mitigation Status**Risk Reference: 243**

Risk	Mitigation Strategy
Contractor becomes complacent in third party insurance claims - could increase cost to the project	1.

Initial Assessment: 5, 2, 1**Risk Owner:** A. Hoe**Current Assessment:** Risk Rating 8 – Construction Risk**Status Log:**

January 2016

1. TPC has not been responsive to insurance claims from 3rd parties, so the claims are being directed to the City,
2. These claims should not be a cost to the Program, due to SFMTA being indemnified.

June 2016:

1. A lapse in time between claims being tendered could be a cost to the Program.

July 2016:

1. The Committee performed a reassessment of the risk, rating will remain an 8.

August 2016:

1. Due to TPC not directing insurance claims to their insurance carrier, SFMTA has been receiving the claims. As part of the construction contract with TPC, SFMTA is indemnified from third part insurance claims.

September 2016:

1. TPC is now being responsive to claims.

October 2016:

1. Third party claims are be addressed by the Contractor. Dollar amounts paid by the Contractor are not known by the Program.

Risk Mitigation Status

Risk Reference: 244

Risk	Mitigation Strategy
Olivet building - potential coordination issues	<ol style="list-style-type: none">1. Maintain contact with the Developer2. Facilitate completion of TPC work overlapping with developer access

Initial Assessment: 1, 1, 1

Risk Owner: M. Vilcheck

Current Assessment: Risk Rating 2 - Construction Risk

Status Log:

January 2016:

1. Risk 216 December's 2015 risk update, stated the Developer has completed demolition and now in shoring/foundation installation phase.
2. Risk 216 - Olivet building potential construction impact was retired on January 07, 2016.
3. Developer has requested an additional space including 17'- wide sidewalk along 4th Street and 4'-wide sidewalk on Clementina frontage has been requested Risk 216
4. This new risk (244) was established to track potential coordination issues with Developer, which could arise due to their ongoing activities.
5. RE will contact developer notifying them they cannot occupy space between Jan 2016 and the next 3mos, due to CSP construction commitments.

February 2016:

1. No change.
2. The committee performed a assessment of this risk to determine its current Risk rating of a 2.

March 2016:

1. No change.

June 2016:

1. Hotel development is now in vertical construction phase. Coordination in progress to accommodate installation of developer's double-cab lift on 4th Street sidewalk area. Coordination will be ongoing between hotel and YBM activities.

September 2016:

1. Hotel developer's lift was installed and hotel development vertical construction has proceeded. Coordination ongoing as needed.

October 2016:

1. No change.

Risk Register

	A	H	I	J	K	L	M	N	O	P	Q	R	S
1	PROJECT RISK REGISTER					Low (1)	Medium (2)	High (3)	Very High (4)	Significant (5)	Legend		
2	Central Subway Project San Francisco				Probability	< 10%	<> 10-50%	> 50%	<> 75% & 90%	>90%	<3 Low	RISK RATING = PROBABILITY X (COST IMPACT + SCHEDULE IMPACT)	
3	REV : 60				Cost Impact	< \$250K	<> \$250K - \$1M	<> \$1M - \$3M	<> \$3M - \$10M	>\$10M	3-9 Medium	2	
4	DATE ISSUED: 10/06/16				Schedule Impact	< 1 Month	<> 1 - 3 Months	<> 3-6 Months	<> 6 - 12 Months	> 12 Months	>10 High	SCORE = PROBABILITY X (COST IMPACT + SCHEDULE IMPACT)	
5	Final Risk ID	Risk Description	Mitigation Description	Risk Category	Probability %	Cost Impact	Schedule Impact	Calc Impact	Calc %	Risk Rating	Score	Status	Must Complete by Date
12	Underground Tunnel												
45	115	Jet grouted station end walls are installed by Tunnel contractor. Station Contractor assumes risk of possibly leakage problems due to insufficiently qualify of end walls.	1. In the 1252 contract, have tunnel contractor set aside a pre-determined amount of money in escrow that can be used to repair any leaks encountered by the station contractors after the in the jet grout end walls are excavated. 2. Alternatively, place an allowance in the station contracts for end wall leakage repair.	C	3	1	1	1	50%	3			5/26/15 UMS1295
52	Track Embedded												
55	Track: Special												
58	MOS Station												
92													
108	34	Loss of business results in unanticipated restrictions on construction at UMS	1. Public outreach. 2. Work closely with Merchant's Association. 3. Maintain regular and open communications so Merchants know construction plans and progress at all times. 4. Advertise that Stockton Street Merchants are Open for Business. 5. Require Contractor to coordinate with merchants, maintain access to businesses and assist with deliveries and pick-ups, continuously cleanup site, and provide pedestrian and vehicle traffic and protection plans, informational signage, and minimum sidewalk widths. 6. Require barriers to protect pedestrians and shield them from noise and dirt from construction. 7. Work with the Union Square BID or MOED to increase cleanup of the area and assist pedestrians across streets. 8. Include this work in cost & schedule estimates.	C	1	3	1	2	10%	2	4	Mitigation measures to be implemented and to the extent possible requirements will be written into contract documents to minimize disruptions to businesses.	09/07/16 UMS1430
112	36	Damage to buildings or utilities as a result of heave from grouting at UMS.	1. Utilize tangent piles combined with surface jet grouting.	C	5	1	1	1	90%	5	10	Mitigation measures implemented in contract documents to reduce risk	4/14/15 UMS1310
113	37	Damage to adjacent buildings at UMS due to surface construction activities.	1. Require protective barriers. 2. Have an emergency and rapid response customer focused task force to fix damaged facilities. 3. Quickly repair and reimburse resulting costs. 4. Include probable cost in estimate.	C	1	2	-	1	10%	1	2	Mitigation measures implemented in contract documents to reduce risk	9/7/16 UMS1430
160	Q	As-built drawings and UMS construction drawings do not contain enough information to produce shop drawings without significant surveying effort delaying construction north entrance.	1. Investigate if electronic files of design can be given to the contractor. 2. Clearly define shop drawing criteria in the technical specifications. 3. Make as-built drawings available as reference drawings to the contractor	C	3	1	1	1	50%	3	6	Specifications require contractor to survey USG in order to develop shop drawings for structural steel.	3/24/12 UMS1280
161	CTS Station												

Risk Register

	A	H	I	J	K	L	M	N	O	P	Q	R	S
1	PROJECT RISK REGISTER					Low (1)	Medium (2)	High (3)	Very High (4)	Significant (5)	Legend		
2	Central Subway Project San Francisco				Probability	< 10%	<> 10-50%	> 50%	<> 75% & 90%	>90%	<3 Low	RISK RATING = PROBABILITY X (COST IMPACT + SCHEDULE IMPACT)	
3	REV : 60				Cost Impact	< \$250K	<> \$250K - \$1M	<> \$1M - \$3M	<> \$3M - \$10M	>\$10M	3-9 Medium	2	
4	DATE ISSUED: 10/06/16				Schedule Impact	< 1 Month	<> 1 - 3 Months	<> 3-6 Months	<> 6 - 12 Months	> 12 Months	>10 High	SCORE = PROBABILITY X (COST IMPACT + SCHEDULE IMPACT)	
5	Final Risk ID	Risk Description	Mitigation Description	Risk Category	Probability %	Cost Impact	Schedule Impact	Calc Impact	Calc %	Risk Rating	Score	Status	Must Complete by Date
163	46	Public complaints result in unanticipated restrictions on construction at CTS. (schedule and estimate for underground work assumes 6 day work week and 2 shifts per day)	1. Public outreach. 2. Maintain regular and open communications so Public knows construction plans and progress at all times. 3. Require Contractor to assist Public Outreach efforts, maintain access to businesses and assist with deliveries and pick-ups, control noise and vibration, continuously cleanup site, and provide pedestrian and vehicle traffic and protection plans, informational signage, ADA ramps and minimum sidewalk widths. 4. Require barriers to protect pedestrians and shield them from noise and dirt from construction. 5. Work with MOED to increase cleanup of the area and assist pedestrians across streets, as needed. 6. Monitor and enforce noise, vibration, ADA, traffic, and cleanup requirements. 7. Quickly process and resolve damage and accident claims from the Public. 8. Include this work in cost & schedule estimates.	C	2	5	1	3	35%	6	12	Implementation of mitigation measures part of Communication/Outreach plan and certain aspects to be included in the contract documents.	10/9/17 CTS1500
167	48	Incomplete drawdown of groundwater. (inside of box and inside of caverns)	1. Require additional grouting to limit leakage to permissible level. 2. Include probable grouting work in cost & schedule estimates. 3. Include allowance for dewatering within cavern during construction.	C	2	2	1	2	35%	3	6	Mitigation measures have been included in contract documents	5/1/16 CTS1140
175	52	Unacceptable settlement and impact on major utilities at CTS. (OLD SEWERS AND OTHERS WITHIN 20FT SPACE BETWEEN TOP OF CAVERN AND STREET LEVEL)	1. Evaluate effect of potential settlement on utilities. 2. Slip-line sewer by TBM contractor. 3. Reinforce other utilities as needed, monitored during construction, and repair / replace, as needed. 4. Have contingency repair/restoration plan. 5. Utility contact information and procedure will be on plans. 6. Develop an allowance for utility repair. 7. Include probable cost in estimate. 8. Need to identify the new SFPUC contact	C	3	3	1	2	50%	6	12	Project configuration change, lowered station 25 ft. reducing the probability of this risk. Risk rating lowered.	4/22/16 N-CTS9730
216	General												
218	Demolition, Clearing , Earthwork												
220	Site Utilities, Utility relocations												
230	Hazmat, Contaminated Material												
234	Environmental Mitigations												
237	67	Archeological/Cultural findings during construction increases schedule and/or cost. (UMS)...LESS THAN 1%	1. Provide on-call Archeologist. 2. Provide allowance and procedure in contract for Archeological/Cultural discoveries.	C	3	1	2	2	50%	5	9	Mitigation measures to be implemented in contract documents	8/12/15 UMS1320
240	Site Structure incl. sound walls												
242	Auto/bus/van access ways, roads												
247	Train Control and Signals												
249	72	Interface new Signaling and Train Control system to existing at Fourth and King	1. Connect new system in parallel with existing system until the new system has been tested and safety certified for operation.	C	2	2	3	3	35%	5	10	Awaiting approval of contract plans by Muni Operations.	3/4/16 STS1045

Risk Register

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1	PROJECT RISK REGISTER												
2	Central Subway Project San Francisco												
3	REV : 60												
4	DATE ISSUED: 10/06/16												
						Low (1)	Medium (2)	High (3)	Very High (4)	Significant (5)	Legend		
					Probability	< 10%	<> 10-50%	> 50%	<> 75% & 90%	>90%	<3 Low	RISK RATING = PROBABILITY X (COST IMPACT + SCHEDULE IMPACT)	
					Cost Impact	< \$250K	<> \$250K - \$1M	<> \$1M - \$3M	<> \$3M - \$10M	>\$10M	3-9 Medium	2	
					Schedule Impact	< 1 Month	<> 1 - 3 Months	<> 3-6 Months	<> 6 - 12 Months	> 12 Months	>10 High	SCORE = PROBABILITY X (COST IMPACT + SCHEDULE IMPACT)	
5	Final Risk ID	Risk Description	Mitigation Description	Risk Category	Probability %	Cost Impact	Schedule Impact	Calc Impact	Calc %	Risk Rating	Score	Status	Must Complete by Date
258	PR78	Delays or complication by other SFMTA projects delays CSP: radio, fare collection, C3/TMC	1. Monitor other projects' developments. 2. Develop contingency plans as needed to avoid 1256 delay of revenue service.	C	2	2	2	2	35%	4	8		7/27/12 FDS 1940
260	Traffic signals & Crossing Protn.												
262	Fare Collections Systems												
265	Purchase or lease of Real Estate												
273	Reloc. of Household or Business												
275	Vehicles												
278	Preliminary Engineering												
291	95	Contractor default during construction impacts schedule. (key sub-contractor)	1. Assist Bonding company in transition and to maintain schedule.	C	1	2	2	2	10%	2	4		11/17/17 STS 1500
297	99	Breakdown in relationships between SFMTA and Contractors during construction results in increased claims and delays to the overall construction schedule.	1. Executive partnering and alternate dispute resolution. 2. Provide incentives in construction contracts in addition to penalties	C	2	4	1	3	35%	5	10	Mitigation measures being implemented	7/27/12 FDS 1940
299	100	Procurement of long lead items delays work. (fans, rails and special track work, TPSS, Escalators, elevators, TBM)	1. Include schedule milestones for procurement of and substantial payment for stored long lead items in contract to encourage early procurement. 2. Monitor procurement of critical items.	C	1	2	2	2	10%	2	4	Not considered a project risk.	11/17/17 STS 1500
305	PR37	Temporary construction power and ability to provide permanent power feed - PGE ability to provide power requirements to the program together with their other commitment	1. Identify temporary power requirements for station construction. 2. Investigate the timing of the permanent feed.	C	2	1	2	2	35%	3	6	Cost for First and Redundant electrical services need to be included in Cost Estimate.	5/3/18 STS1080
306	Insurance, permits etc.												
307	103	Difficulty in getting required permits.	1. Coordinate with permit officials and request permits as early as possible. 2. Obtain assistance obtaining permits from PM/CM & FD Consultants.	C	1	2	1	2	10%	2	3		12/18/12 FDS 1275
308	104	CPUC approval at Grade Crossing for G0164d takes longer to negotiate / obtain than schedule allows	1. Obtain Grade Crossing approvals at final CPUC inspection at the completion of construction. 2. Coordinate closely with CPUC until approval is received.	R	2	3	2	3	35%	5	10	CPUC Resolution (TED-253) for extension of our at grade crossing was granted.	7/27/12 FDS 1940
309	105	Electrical service delays startup and testing.	1. Submit applications for new service as early as possible. 2. Coordinate closely with PG&E to ensure timely delivery of electrical service.	C	1	2	1	2	10%	2	3	Applications for new service have been submitted to PG&E.	11/17/17 STS 1500
310	106	Risk of Labor dispute delaying the work.	1. Enforce designated gate for employees of the contract in dispute so that the rest of the work is not delayed.	C	2	1	1	1	35%	2	4		11/17/17 STS 1500
312	Unallocated Contingency												

Risk Register

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5	Final Risk ID	Risk Description	Mitigation Description	Risk Category	Probability %	Cost Impact	Schedule Impact	Calc Impact	Calc %	Risk Rating	Score	Status	Must Complete by Date
317	111	Major Earthquake stops work	1. Include Force Majeure clause in contracts.	C	1	5	3	4	10%	4	8	Force Majeure clause included in contracts.	12/30/20 MS 0010
318	112	Major safety event halts work	1. Require contractor Safety plan to address this risk. 2. CM inspections to ensure that safety plan and procedures are implemented.	C	1	5	3	4	10%	4	8	Health and Safety provisions included in contracts. CS Program provides full-time Safety Manager.	12/30/20 MS 0010
320													
330	205	Prolong period of CMod's creates additional cost/causes bad blood between Resident Engineer and Contractor	1. CMod Task Force - 5 Areas of Improvement 2. Implement 3. Delegation of Authority	C	4	2	1	2	80%	6	12		
339	214	Micro Piles at UMS interfere with Tube-a-manchette installation (60' deep micropiles)	1. Provide micro-pile as-built information to contractor 2. Realign tube-a-manchettes clear of micro-piles	C	3	1	1	1	50%	3	6		
342	217	Delays or complications construction by others – SF Dept. Of Technology, 3rd party utilities	1. Early engagement and coordination for agreements and plan development to avoid construction delays.	C	2	1	1	1	35%	2	4	DTIS MOU has been signed.	
349	224	CTS AWSS/Ductbank Interface - AWSS system is old and requires replacement	1. Look at alternatives to address 2. Turn off system while CSP work is being done, and then turn on later (find a bypass).	C	2	1	1	1	35%	2	4		
352	227	LRV Training - having enough trained operators (surplus)	1. Ramp up trained operators a year ahead of time 2. Ensure testing is finished 3. Completion of work at storage track location (Bryant & King)	C	1	2	1	2	10%	2	3		
353	228	Muni union workers - barn signup (preferred runs)	1. Try to get six months advance notice for annual in addition to barn sign up. 2. Trapeze (software) - enter CSP runs.	C	1	1	4	3	10%	3	5		
354	229	CN1300 System Acceptance Testing	1. Identify Duration	C	3	1	3	2	50%	6	12		
355	230	SFMTA Commissioning Coordination	1. Fully develop rail activities 2. Identify SFMTA liaisons to perform activities 3. Have SFMTA OPS review startup and testing Plan	C	3	1	3	2	50%	6	12		
357	232	Behind Schedule - Unable to Recover from Delay to 1300 Contract	1. Schedule analysis of number of days behind	C	4	3	3	3	80%	12	24		
358	233	Shotcrete Substitution - Final Finish Concrete Lining is Inferior	1. Meet and discuss with TPC's senior management what the issues are and the status for clarification.	C	3	3	3	3	50%	9	18		
359	234	Sequential Excavation Method at CTS - Contractor's propose method will induce subsidence	1. Designers concurrence on variation of options 2. Presented four options to the Contractor for going forward	C	2	4	3	4	35%	7	14		
360	235	Sewer work running up and down Stockton Street		C	1	3	1	2	10%	2	4		

Risk Register

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4	DATE ISSUED: 10/06/16				Schedule Impact	< 1 Month	<> 1 - 3 Months	<> 3-6 Months	<> 6 - 12 Months	> 12 Months	>10 High	SCORE = PROBABILITY X (COST IMPACT + SCHEDULE IMPACT)	
5	Final Risk ID	Risk Description	Mitigation Description	Risk Category	Probability %	Cost Impact	Schedule Impact	Calc Impact	Calc %	Risk Rating	Score	Status	Must Complete by Date
362	237	Non-Conforming work is not identified by TPC's Quality Control Program	1. Correction Action Plan from Contractor 2. Stand down Meeting with Contractor 3. Augmentation of Management Staff 4. Higher Cross Standards 5. QA (greater surveillances) 6. Bring on additional personnel within the Smith-Emery organization	C	2	3	2	3	35%	5	10		
363	238	Quality Program is ineffective in processing the nonconformance items causing schedule impacts	1. Review the CNCR log on a biweekly basis at the joint TPC /SFMTA meeting. 2. Greater Clarity in the Log on what CNCR's are open	C	3	2	2	2	50%	6	12		
365	240	Unresolved Assignment of Schedule Delay Responsibility (may lead to increase cost)	1. Ask the Contractor for TIA's 2. As built schedule (Program analysis) 3. Perform a more refined analysis	C	2	4	4	4	35%	8	16		
368	243	Contractor becomes complacent in third party insurance claims - could increase cost to the project		C	5	2	1	2	90%	8	15		
369	244	Olivet building - potential coordination issues	1. Maintain contact with the Developer 2. Facilitate completion of TPC work overlapping with developer access	C	2	1	1	1	35%	2	4		
371	246	Design changes not being captured in as-builts	1.Ensure Contractor is including all PCC design change details onto the as-builts dwgs	C	2	1	1	1	35%	2	4		