central T subway

Connecting people. Connecting communities.

Risk Mitigation Meeting Minutes #67

DATE:	July 02, 2015
MEETING DATE:	**February 10, 2015**
LOCATION:	821 Howard Street, 2nd Floor – Main Conference Room
TIME:	2:00pm
ATTENDEES:	John Funghi, Albert Hoe, Richard Redmond, Mark Latch, Roger Nguyen Eric Stassevitch, Beverly Ward,
COPIES TO:	Attendees: Roger Nguyen, Alex Clifford, John Lackey, Bill Byrne, Jane Wang, Sanford Pong, Luis Zurinaga, Jeffrey Davis File: M544.1.5.0820
REFERENCE	Project No. M544.1, Contract No. 149 Task 1-4.01 Program/Construction Management
SUBJECT:	**Risk Management – Risk Mitigation Meeting** **Risk Mitigation Report No. 67**

RECORD OF MEETING

ITEM #	DISCUSSION	ACTION BY DUE DATE
1 -	**Report on Red Risk and – (Risk rating ≥ 6)**	
	Risk 225: Ellis Street Utilities (unknown underground utilities) Discussion: A. Hoe spoke with representatives from AT&T and PG&E. They were unable to provide any more information than what is already known. Vaults near Ellis & Market Street are known to have a lot of abandon and single utilities in the area. The entire site has been dug up. However, the Contractor has yet to reach the bottom. This risk will remain open until the Contractor hits the bottom. **Risk Rating 10** **Risk 226**: 4th and King Street - Potential time for planned work shutdown - Contractor not able to perform the work in the manner prescribed Discussion: The Contractor has scheduled the 8wk shutdown. The RE will issue a letter to TPC, requesting the status of operations in that area. The Program requires the Contractor to respond to the question of: The status of the site specific work plan for the proposed 10-day shutdown, detail of the schedule showing activities with planned duration, identify the location for where the portable cross-over will go and the name (contact person) of the Contractor's System Integration Manger. **Risk Rating 9**	
2 -	**Report on Remaining Requirement Risks (Risk rating ≤ 6)**	
	Risk 79 & 104: No new information was reported on the two remaining	

ITEM #	DISCUSSION	ACTION BY DUE DATE
	requirement risk. Visibility of these risks will continue to be present on future agendas until they have been completely mitigated.	
3 -	**Active Construction Risks**	
	Risk 52: Unacceptable settlement and impact on major utilities at CTS. (OLD SEWERS AND OTHERS WITHIN 20FT SPACE BETWEEN TOP OF CAVERN AND STREET LEVEL) Discussion: Slipping lining of the brick sewers will take place after the Chinese New Year. The RE needs to setup a meeting with SFPUC to identify any obstruction that might affect the work. Also, request reimbursement to the Program for cost to relocate the potential obstructions. In addition, the RE has identified a 12-inch 100-year-old water line as a potential risk in the area. This requires funding from SFPUC to upgrade. **Risk Rating 6** **Risk 66**: Archeological/Cultural findings during construction increases schedule and/or cost.(Moscone) AROUND 10% Discussion: Surface slab pour. Concrete placement activity has been delayed because of TPC. TPC is not ready to do the roof pour. A letter was sent to the Contractor identifying 8 items, which they have yet to address to including: waterproofing installation , rebar issues (cleanliness/damage), damage HRC couplers. **Risk Rating 3** **Risk 72:** Interface new Signaling and Train Control system to existing at Fourth and King Discussion**:** S. Pong needs to schedule a meeting with HNTB (DP3) to address the issue of the design intent for interfacing of the system signaling and train control. **Risk Rating 5** **Risk 204**: Relocation of AT&T Vault and other utilities delays Work south of Bryant Discussion: An internal meeting needs to be schedule with PUC and the RE needs to request a price quote from BKF Design. **Rating 3** **Risk 211**: Differing site conditions encountered during ground freezing of Cross Passage results in increased costs Discussion: A denial letter was sent to the Contractor in response to their request for a time extension to perform remediation work of CP-5 based on their claim of a DSC. The letter also reminded the Contractor the geotechnical baseline report was not to be relied upon during ground freezing process. The geotechnical data was in part, in anticipation of the Contractor utilization of jet grout to prepare the ground for construction of Cross Passage 5. SFMTA is still waiting on the Contractor's Root Cause Analysis to be submitted. **Risk Rating 2** **Risk 212**: UMS Inclined piles – 8" clearance between piles and tunnel results in damage or safety issues within the tunnel Discussion: Twelve more piles to go. There are no issues. **Risk Rating 4** **Risk 231**: Implement 4th Street closure - minimize impact to traffic flow on Perry	

ITEM #	DISCUSSION	ACTION BY DUE DATE
	& Stillman Streets Discussion: Some minor issues with the turn off Perry being a tight for the Golden Gate Transit drivers. **Risk Rating 2**	
4 -	**Other Business - Potential Risk**	
	Risk 232: Schedule Mitigation - Ways to mitigate potential delays Discussion: 1300 Contractor submitted their schedule update on February 04, 2015. The schedule shows an approximate six-month delay. The Contractor has not submitted a TIA to justify their claim. The Contractor needs to recovery time and will be put on notice that, activities where the can work two shifts they should do so. **Risk Rating TBD** **Risk 233:** Shotcrete Substitution - in the Stations for final lining Discussion: CSDG (DP2) has been authorized to look at the Contractor shotcrete resubmittal. **Risk Rating TBD** **Risk 234:** Sequential Excavation Method at CTS (SEM) Sequence - Contractor proposes to build the north and south platform simultaneously Discussion: No new update on this risk. SFMTA is waiting for TPC's resubmittal. **Risk Rating TBD**	
	New Risk: UMS North Concourse Roof Issues - 12-inch waterline relocation Discussion: Four issues have been identified in the area of work done by the precious 1251 Contractor. Direction will be given to the Contractor to raise the MRY duct bank. **Risk Rating TBD**	

ACTION ITEMS –

ITEM #	MTG DATE	Task #	DESCRIPTION	BIC	DUE DATE	STATUS
4	12/13/12		**Risk 72** – 4th & King (SSWP)	S. Pong C. Morganson	03/10/15	Open

Meeting adjourned at 3:10pm

These meeting minutes have been prepared by B. Ward and reviewed by E. Stassevitch, 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 & reviewer] **Date:** 02Jul15 [Date review completed.

central T subway

Connecting people. Connecting communities.

Meeting Agenda

Project No. M544.1, Contract No. CS-149
Program/Construction Management
Risk Mitigation Management Meeting No. 67
February 10, 2015
2:00pm – 4:00pm
Central Subway Project Office
821 Howard St. 2nd Floor
Main Conference Room

Attendees:

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

1. **Report on Red Risks (Risk Rating 6 and above)**
   - **Construction Risks** (225, 226)
2. **Report on Remaining Requirement and Design Risks**
   - **Requirement Risks** (79, 104)
3. **Active Risks**
   - **Construction Risks** (52, 66, 72, 204, 211, 212, 214, 231)
4. **Risk Assessment and Mitigation Strategies**
   - 232 - Schedule Mitigation - Ways to mitigate potential delays
   - 233 - Shotcrete Substitution for final lining
   - 234 - SEM Sequence at CTS - Two directions simultaneously

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

central T subway

Connecting people. Connecting communities.

Meeting Attendance Sheet

Project No. M544.1, Contract No. CS-149
Program/Construction Management
Risk Management Meeting No. 67
February 10, 2014
2:00 p.m. – 4:00 p.m.
Central Subway Project Office
821 Howard Street, 2nd Floor
Main 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	415-701-4299	John.funghi@sfmta.com	
Albert Hoe	SFMTA	415-701-4289	Albert.hoe@sfmta.com	
John Lackey	DEA/PMOC	503-499-0596	jal@deainc.com	
Mark Latch	CSP	415-701-5294	Mark.latch@sfmta.com	
Roger Nguyen	SFMTA	415-701-4312	Roger.Nguyen@sfmta.com	
Richard Redmond	CSP	415-660-5407	Richard.redmond@sfmta.com	
Eric Stassevitch	CSP	415-701-4426	Eric.stassevitch@sfmta.com	
Beverly Ward	CSP	415-701-5291	Beverly.ward@sfmta.com	
Luis Zurinaga	SFCTA	415-716-6956	luis@sfcta.org	

Risk Mitigation Status
Risk Reference: 225

Risk		Mitigation Strategy
Ellis Street Utilities (unknown underground utilities)		1. Proactive investigation into identify the issue 2. Engineers should review and make a recommendation 3. Early review of potholing information for potential conflicts 4. Put utilities on red alert

Initial Assessment: 5 (2, 2, 2)
Current Assessment: 10

Risk Owner: A. Hoe/R. Redmond

Status Log:

July 2014:

1. The Contractor has verbally mentioned some utility issue on Ellis Street, but has not submitted any documentation concerning the issue.
2. The Engineering team will review the issue and make a determination.

October 2014:

1. Contractor has notified SFMTA of DSC however, no official letter notification has been submitted.
2. Additional mitigation strategies were added to this risk.
    a. Review Contractor's potholing plan for inconsistently
    b. Determine what TPC issues are
    c. Investigate the Contractor DSC claims, what have they found

November 2014:

1. Contractor has not submitted any information concerning their DSC claim.

December 2014:

1. No further notice has been received from the Contractor on any issues.
2. Ellis Street has been closed to help the Contractor mitigate the risk area.
3. A. Hoe will take the lead in focusing on the investigation of the utilities in the area.

January 2015:

1. There was an issue with a vault which could possibly impact sheeting. The issue has now gone away.

February 2015:

1. A. Hoe contacted DPW requesting information, none was provided. Additionally A. Hoe met with Utility representatives for PG&E and AT&T. No information was obtained regarding the unknown underground utilities.
2. This risk item will remain open until the Contractor has reached the bottom.

Risk Mitigation Status
Risk Reference: 226

Risk		Mitigation Strategy
4th and King Street - Potential time for planned work shutdown - Contractor not able to perform the work in the manner prescribed		1. Identify schedule of potential time for planned work shutdown 2. Identify better traffic patterns 3. Pursue 4th & King option to achieve additional 3-6mos on the schedule 4. Review Giants and Warriors schedule for home games

Initial Assessment: 3, 3, 3 **Risk Owner:** M. Acosta
Current Assessment: Risk Rating 9 – Construction Risk

Status Log:

November 2014:

1. Contractor has yet to submit a proposal for the 4th and King planned shutdown.

December 2014:

1. Contractor has yet to submit a complete proposal for the traffic system. SFMTA Operations is willing to discuss (internally) alternative shutdown periods.
2. A dedicated team needs to be establish to focus on this 8wk sequence of shutdown activity.
3. Item to be elevated for discussion at Partnering session.

January 2015:

1. Letter will be sent to the Contractor rejecting their incomplete proposal.

February 2015:

1. The RE reported the Contractor has already planned the 8-week shutdown in the schedule. However, the Contractor has yet to provide a master work plan. The RE will a send a letter to the Contractor requesting information:
    a. Provide the status of the site specific work plans for the proposed 10-day shutdown.
    b. Per spec sect requirement 34 11 00 3.04. Contractor is required to provide a detail of the schedule showing activities with a planned duration.
    c. Identify the location for where the portable cross-over will go.
    d. Provide the name (contact person) of the Contractor's System Integration Manger.

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)		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:** M. Kobler
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)		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:** M. Kobler
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

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)		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:** M. Kobler

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 at risk. Prepare a conceptual waterline layout and present to utility owner (PUC) and request funding to upgrade their line.

Risk Mitigation Status
Risk Reference: 66

Risk	Mitigation Strategy
Archeological/Cultural findings during construction increases schedule and/or cost.(Moscone) AROUND 10%	1. Provide on-call Archeologist 2. Provide allowance and procedure in contract for Archeological/Cultural discoveries.

Initial Assessment: 1, 1.5, 2 **Risk Owner:** M. Vilcheck
Current Assessment: Risk Rating 3 – Construction Risk

Status Log:

February 2012 Meeting:
1. Allowance for archeological discoveries included in contract.
2. Procedure for addressing archeological discoveries is included in contract.
3. Current exposure is only to those amounts above those currently identified.
4. Recommend to reduce the risk rating.

March 2013:
1. Allowance for archaeological discoveries included in CN 1300 YBM-AL-6
2. Discuss reducing this risk rating (current schedule impact > 12months), and transferring risk ownership to CM team
3. It was discussed that the cost impact should be reduced from 2 ($250k to $1m) to 1, <$250k, the risk rating revised to 3

January 2015:
1. Allowance for archaeological discoveries activated related to multiple midden layers and human remains.
2. Possible impacts/costs associated with roof slab excavation and placement.

February 2015:
1. No status change to this risk from last month's update. Roof slab has been delayed due to not being ready to pass the preparatory meeting. Several open issues were discussed to be resolved prior to the surface slab concrete placement, as noted in CN1300 Letter No. 0518.

Risk Mitigation Status
Risk Reference: 72

Risk	Mitigation Strategy
Interface new Signaling and Train Control system to existing at Fourth and King	New system will be connected in parallel with existing system until the new system has been tested and safety certified for operation.

Initial Assessment: 2, 3, 5
Current Assessment: Risk Rating 5 – Design Risk

Risk Owner: S. Pong

Status Log:

October 2011 Meeting:
1. Recommend to retire this risk from the project.
2. Risk not retired. Systems contract drawings need approval of Muni Operations.

November 2011:
1. Functional requirements for the interface have been approved by Muni Operations.
2. 90% design drawings for Systems contract will be forwarded to Muni Operations for their review and comment.

January 2012 Meeting:
1. Concept design with SFMTA Operations recommended safety enhancements have been approved.
2. ECP for recommended safety enhancements prepared and will be submitted to CMB for approval.

February 2012:
1. CMB approved ECP for Operational & Safety Upgrades.
2. SFMTA Muni Operations signed off on ECP.
3. ECP being implemented by design team.
4. Recommend to reduce this risk rating.

September 2012 Meeting:
1. Update to be provided next meeting.
2. New plan to be advised, mitigation strategy to be revised.

October 2012 Meeting:
1. Central Subway have sent a letter to Ops including contract specifications, temporary and permanent requirements seeking concurrence
2. Ross/Carlos to provide a briefing next meeting regarding how signaling interface design has ensured functionality at the end of each weekend shutdown.

November 2012 Meeting:

1. Technical specifications now approved.

Risk Mitigation Status
Risk Reference: 72

Risk		Mitigation Strategy
Interface new Signaling and Train Control system to existing at Fourth and King		New system will be connected in parallel with existing system until the new system has been tested and safety certified for operation.

2. A presentation is to be given at the December Risk meeting to demonstrate that the signaling design has confirmed functionality can be maintained where required, and reinstated following the 6 weekend shutdowns.

December 2012 Meeting:

1. Clarification system will not be parallel
2. System train control will not be done during track and OCS construction
3. New switch machine have similar controls as the old machine.
4. Expansion of the Site Specific Work Plan will be established for review by the Risk Committee.

July 2013 Meeting:

1. AFMTA to begin discussions with CN 1300 Contractor – Tutor Perini to develop site specific work plans and identify weekend work windows.

October 2014:

1. Review of the designs constructability needs additional evaluation.
2. A swat team to include Program Management, RE and ARE will be created to address the interface issues between trackwork, signaling and train control system.

February 2015:

1. S. Pong to setup a meeting with the Designer (HNTB) to respond to outstanding questions related to signal and train control.

Risk Mitigation Status
Risk Reference: 204

Risk	Mitigation Strategy
Relocation of AT&T Vault and other utilities delays Work south of Bryant	1. Continue negotiations/ coordination with utility owners. 2. Contract 1300 is required to coordinate with utility companies for relocations 3. SWAT team established to address utilities south of Bryant Street 4. Initiate utility coordination meetings 5. Proactively schedule AT&T resources

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

Risk Owner: M. Acosta

Status Log:

December 2012:

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

January 2013:

1. Need to setup a meeting with AT&T and a representative from the Design side to walk them through what will be done in the 1300 contract.

February 2013:

1. Risk description refined.
2. AT&T were made aware of the potential need for relocation of the vault and duct bank in November 2012.
3. A meeting has been arranged between CSP and AT&T for Tuesday 2/19/13 to follow up on the November meeting and confirm that the vault and duct bank will need to be relocated.
4. Relocation of the vault has been included in the D&B element of the 1300 contract and is the responsibility of the contractor.
5. The 1300 contract requires the contractor to allow 12 months for AT&T to cut over new services from the existing duct bank into a new duct bank proposed within the eastern sidewalk of 4th Street between Bryant and Brannan Streets.

March 2013:

1. Increase scope of this risk to include other utilities; Level 3, PG&E, MRY, ASB, SFWD, SFDT, Comcast.
2. Contractual execution of the trench installation to be discussed.
3. AT&T have not been contacted during 1300 bid.
4. It was discussed that the schedule impact of this risk rating should be increased to 4 (6-12 months), this increased the risk rating to 6

April 2013:

1. Utility relocations may require a joint trench under the Contract 1300 design build scope.
2. If a joint trench is required under the contract the 1300 contractor would manage the implementation of the joint trench, SFMTA would manage the Form B process for reimbursement of the joint trench costs.

Risk Mitigation Status
Risk Reference: 204

Risk	Mitigation Strategy
Relocation of AT&T Vault and other utilities delays Work south of Bryant	1. Continue negotiations/ coordination with utility owners. 2. Contract 1300 is required to coordinate with utility companies for relocations 3. SWAT team established to address utilities south of Bryant Street 4. Initiate utility coordination meetings 5. Proactively schedule AT&T resources

3. Mitigation strategy added that the 1300 contractor is required to coordinate with private utility companies.
4. A SWAT team has been established comprising DP-3 and the Design Oversight manager who are meeting weekly to address utilities south of Bryant. DP3 are preparing Notice of Intent letters for utilities to relocate.

May 2013:

1. Final Notice of Intent letters were sent to private utilities Friday 5/3/13.
2. Final Notice of Intent letters will be sent to AT&T and PG&E the week commencing 5/6/13.

July 2013:

1. Revisit following Tutor baseline submittal.
2. It is noted that the Tutor schedule submitted 5 days following bid closure allowed a 12 month period to cutover to the new AT&T duct but did not appear to allow adequate time for construction of the AT&T duct along 4th Street.
3. Utility coordination meeting will be held to ensure the contract requirements are understood by the contractor.

October 2013:

1. DP-3 Tech memo being finalized
2. Relocation design and construction schedule to be developed

November 2013:

1. Coordination meetings with utility owners to occur on a regular basis, Tutor Perini are to be invited
    a. AT&T plan for resource allocation, confirmation of assets and scheduling of work is to be confirmed as AT&T have very few resources who can complete cutover work
2. SFMTA are currently working with AT&T to establish a feasible location to relocate Vault 2081
3. The importance of this work is to be discussed at the next executive partnering meeting with Tutor

December 2013:

1. Letter was sent notifying the contractor of the criticality of this work and requesting a completion schedule
2. Potential vault location has been identified with AT&T. Feasibility is being confirmed via potholing

January 2014:

1. Potholing to confirm locations of utilities to commence the week of January 20th
2. AT&T are to be put on notice of the expected installation and cut over dates.

Risk Mitigation Status
Risk Reference: 204

Risk	Mitigation Strategy
Relocation of AT&T Vault and other utilities delays Work south of Bryant	1. Continue negotiations/ coordination with utility owners. 2. Contract 1300 is required to coordinate with utility companies for relocations 3. SWAT team established to address utilities south of Bryant Street 4. Initiate utility coordination meetings 5. Proactively schedule AT&T resources

3. Proactively requesting and scheduling AT&T resources added to mitigation strategy.

February 2014:
1. Potholing of utilities has commenced.
2. At the last executive partnering meeting Tutor Perini were tasked with commencing utility coordination meetings.
3. 1/31/14 Letter (CN 1300 Misc. Letter No. 0023) a letter was sent to AT&T notifying them of key dates from Tutor Perini's baseline schedule and requesting AT&T schedule it's resources to meet Tutor Perini's dates.

March 2014:
1. Potholing of utilities is 99% complete. Potholing work at 4th and Townsend remains.
2. Current AT&T ductbank relocation design is constructible but will include relocation of a 20' segment of 12" waterline and shifting of existing AT&T cables.
3. Tutor Perini is projected to start installation of AT&T ductbank by early April 2014 pending completion of soil profile work.

April 2014:
1. Potholing of utilities is 100% complete.
2. There seem to be enough space for a new AT&T manhole and a 36" sewer force main without having to relocate a 20' segment of 12" waterline. Shifting of existing AT&T cables is still necessary at 4th/Bryant; the project team including AT&T Engineer have finalized the workplan to safely accomplish this task.
3. Tutor Perini's subcontractor, Abbett Electric started installation of AT&T ductbank. Abbett decided to temporarily stockpile excavated soils to its yard to be re-used as backfill. Surplus materials to be off hauled pending completion of soil profiling.
4. Risk probability has been reduced to a 1.

May 2014:
1. Installation of AT&T ductbank work continues. Surplus materials to be off hauled pending completion of soil profiling.
2. Expected completion of ductbank and vault installation is July 2014.

June 2014:
1. Installation of AT&T ductbank work continues. Surplus materials to be off hauled pending completion of soil profiling.
2. Expected completion of ductbank and vault installation is September 2014.

Risk Mitigation Status
Risk Reference: 204

Risk	Mitigation Strategy
Relocation of AT&T Vault and other utilities delays Work south of Bryant	1. Continue negotiations/ coordination with utility owners. 2. Contract 1300 is required to coordinate with utility companies for relocations 3. SWAT team established to address utilities south of Bryant Street 4. Initiate utility coordination meetings 5. Proactively schedule AT&T resources

October 2014:

1. Installation of AT&T ductbank work continues. Surplus materials to be off hauled pending completion of soil profiling.
2. Expected completion of ductbank and vault installation is October 31, 2014 for the main trunk. At this time, AT&T can start cut-over process. Note that AT&T had recently requested to install six 4" conduits across Bryant Street. This request does not delay the cut-over start or extend the cut-over duration.

November 2014:

1. Installation of AT&T ductbank work continues. Surplus materials to be off hauled pending completion of soil profiling.
2. Expected completion of ductbank and vault installation is November 26, 2014 for the main trunk.
3. RE sent Miscellaneous City Letter #37 to put AT&T on notice of completion of main ductbank and start of cut-over work. AT&T had requested to install six 4" conduits across Bryant Street; PCC 23 was issued to Tutor. This request does not delay the cut-over start or extend the cut-over duration.

December 2014:

1. Installation of AT&T ductbank work continues. Surplus materials to be off hauled pending completion of soil profiling.
2. Expected completion of ductbank and vault installation is January 30, 2015 for the main trunk.
3. RE sent Miscellaneous City Letter #37 to put AT&T on notice of completion of main ductbank and start of cut-over work. AT&T had requested to install six 4" conduits across Bryant Street; PCC 23 was issued to Tutor. This request does not delay the cut-over start or extend the cut-over duration. RE has not received Tutor's cost proposal

January 2015:

1. No new update from December's report out.

February 2015:

1. Provide a price for BKF Design
2. Set up meeting with PUC

Risk Mitigation Status
Risk Reference: 211

Risk		Mitigation Strategy
Differing site conditions encountered during ground freezing of Cross Passage results in increased costs		1. Contractor has submitted a 'no cost, no schedule' PCC for ground freezing 2. Need early review of work plan, and identification of entity that will perform the work 3. Review Plans 4. Monitor work at CP5 - to ensure no addl cost are incurred by Program

Initial Assessment: 2 (1, 2, 2) **Risk Owner:** A. Clifford**/**R. Redmond
Current Assessment: Risk Rating 2 **-** Construction Risk

Status Log:

February 2013:
1. Identified as a potential risk
2. Majority of risk is carried by the 1252 Contractor

March 2013:
1. Discuss and confirm risk description, mitigations and owner
2. Contractor has submitted a no cost, no schedule PCC for ground freezing.
3. **Recommended risk rating 2 (1, 2, 1)**
    a. Probability (1), <50%, differing ground conditions are considered unlikely
    b. Cost impact (2), $250k to $1m, additional costs would be limited to additional ground freezing work
    c. Schedule impacts (1), <1 month, impact of additional work (if required) is expected to be minor

May 2013:
1. Risk heading revised to include clarification "during ground freezing".

October 2013:
1. Additional mitigation strategy added – Early review of work plan, and identification of entity that will perform the work.

July 2014:
1. Ground freeze pipe installation began in June, and ground condition appears to be consistent in those anticipated.

October 2014:
1. Freeze pipe installation is complete. Freeze plant has been installed and ground freeze has commenced.
2. Contractor experienced difficulty and delay installing the freeze pipes.
3. No notifications have been received for delay or differing site condition from the contractor.

Risk Mitigation Status
Risk Reference: 211

Risk		Mitigation Strategy
Differing site conditions encountered during ground freezing of Cross Passage results in increased costs		1. Contractor has submitted a 'no cost, no schedule' PCC for ground freezing 2. Need early review of work plan, and identification of entity that will perform the work 3. Review Plans 4. Monitor work at CP5 - to ensure no addl cost are incurred by Program

Initial Assessment: 2 (1, 2, 2) **Risk Owner:** A. Clifford**/**R. Redmond
Current Assessment: Risk Rating 2 **-** Construction Risk

November 2014:

1. Ground freezing commenced October 8, 2014. The latest approved schedule allows 42 days for ground freezing which would have ground freezing complete November 19th, 2014.
2. The Contractor is currently forecasting completion of the ground freeze November 30th which is 26 days later than the approved August schedule update date of November 4th.
3. No notifications have been received for delay or differing site condition from the contractor.

December 2014:

1. Excavation of Cross Passage 5 is almost complete (approximately 1' of sump remaining to be excavated as at 12/15/14)
2. No notifications have been received for delay or differing site condition from the contractor.
3. Risk retired by majority consent of the Risk Assessment Committee on 12/16/14

January 2015:

1. Due to the recent ground loss at CP5 with the ground freezing resulting in surface impacts on 4th Street on December 27th, this risk will be reopened.
2. A letter will be sent to Soil Freeze reminding them that any liability concerning this matter is the responsibility of BIH.

February 2015:

1. Awaiting Root Cause analysis form Contractor.
2. Repairs of surface voids and voids in crown of tunnels repairs underway.

Risk Mitigation Status
Risk Reference: 212

Risk		Mitigation Strategy
UMS Inclined piles – 8” clearance between piles and tunnel results in damage or safety issues within the tunnel	√	1. Establish 1252 and 1300 contract requirements to construct within acceptable tolerances 2. Workshop to be held with BIH to discuss hold points during construction, and construction means and methods 3. Confirm tunnel as-built location

Initial Assessment: 4 (1, 5, 3)
Risk Owner: R. Redmond/S. Tisell
Current Assessment: Risk Rating 4 - Construction Risk

Status Log:

February 2013:

1. Identified as a potential risk

March 2013:

1. Discuss and confirm risk description, mitigation strategy and initial risk rating.
2. Workshops are to be held with BIH to increase their understanding of the interfaces with the 1300 contract.
3. Issues to be addressed will be identified and piling hold points will be discussed.
4. Tunnel construction tolerance is 4” from bulls eye, 8” clearance is in addition to the 4” tunnel tolerance.
5. **Recommended risk rating 4 (1, 5, 3)**
    a. Probability (1), <10%, considered possible but unlikely
    b. Cost impact (5), > $10m, significant costs expected if tunnel collapse occurred
    c. Schedule impacts (3), 3 - 6 months, significant schedule impacts if tunnel collapse occurred

April 2013:

1. Hold points in 1300 Contract have been identified.
2. Workshops are to be held between BIH and the 1300 Contractor to address interfaces between the contracts.

October 2013:

1. Potential for damage and safety issues in tunnel to be discussed and defined
2. Establish task force - to create action plan that specifically guides the Program successfully thru this risk.
3. Action plan to address Cost and Schedule concerns.
4. Confirm contract requirements in 1300 about tunnel bracing.
5. Update mitigation strategy – to include current contract requirements for 1300 related to bracing and work above the tunnel.
6. Follow up with the designed on what loads can the liner support?
7. Facilitate the early cooperation of 1252 Contractor and 1300 Contractor to implement appropriate plan.
8. Work together with 1300 Contractor – to sequence the work in a manner to avoid exposure to the condition.

Risk Mitigation Status
Risk Reference: 212

Risk		Mitigation Strategy
UMS Inclined piles – 8" clearance between piles and tunnel results in damage or safety issues within the tunnel	√	1. Establish 1252 and 1300 contract requirements to construct within acceptable tolerances 2. Workshop to be held with BIH to discuss hold points during construction, and construction means and methods 3. Confirm tunnel as-built location

November 2013:

1. Tunnel bracing is suggested per the contract as means and methods are to be determined by the contractor
2. Concerns raised by Tunnel Contractor are to be communicated to Designer. Designer to comment of validity of those concerns.

December 2013:

1. Station contractors piling submittal will be provided to Tunnel contractor for information
2. Tunnel as-built information will be forwarded to Station contractor upon completion of tunneling through UMS
3. The need for a workshop will be established following review of the above documents by each contractor

April 2014:

1. Meeting was held yesterday with Tutor , BECHO, SFMTA and CSDG to review and respond to clearance questions
2. Follow up meeting will be scheduled between all parties
3. Final review comments of Contractor's work plan is pending

May 2014:

1. Months of collaboration, calculation checks and verification between SFMTA, Tutor and CSDG has led to 3 batter piles installed with no issues.

June 2014:

1. To date 16 of 197 battered piles have been installed successfully.

October 2014:

1. Approximately 134 of 198 piles have been completed without incident.

November 2014:

1. Approximately 162 of 198 piles have been completed without incident

December 2014:

1. Pile work has ceased due to the Moratorium. Work will being again in mid-January 2015.

Risk Mitigation Status
Risk Reference: 212

Risk		Mitigation Strategy
UMS Inclined piles – 8” clearance between piles and tunnel results in damage or safety issues within the tunnel	√	1. Establish 1252 and 1300 contract requirements to construct within acceptable tolerances 2. Workshop to be held with BIH to discuss hold points during construction, and construction means and methods 3. Confirm tunnel as-built location

January 2015:

1. Pile work is expected to ramp back up around the 3rd week of January. There are 37 piles remaining to be completed.

February 2015:

1. Pile work is continuing, with 12 piles remaining to completion.

Risk Mitigation Status
Risk Reference: 214

Risk		Mitigation Strategy
Micro Piles at UMS interfere with Tube-a-manchette installation (60' deep micropiles)	√	1. Provide micro-pile as-built information to contractor 2. Ensure tube-a-manchettes are realigned to be installed clear of micro-piles

Initial Assessment: 1, 1, 3 **Risk Owner:** A. Clifford
Current Assessment: Risk Rating 3 - Construction Risk

Status Log:

February 2013:
1. Identified as a risk

March 2013:
1. Discuss risk description, mitigation strategy and risk rating
2. Central Subway has responded to Contractors RFI and provided as-built information for the micropiles
3. Contractor will work to install tube-a-manchettes to avoid micropiles
4. **Recommended risk rating 3 (3, 1, 1)**
    a. Probability (3), >50%
    b. Cost impact (1), <$250
    c. Schedule impacts (1), <1 month

April 2013:
1. Contractor is reviewing the micropile as-built information
2. An additional mitigation was added to ensure the tube-a-manchettes are realigned to be installed clear of the micro-piles
    a. A workshop will be held between the PB and BIH to resolve the required geometry to install the tube-a-manchettes clear of the micro-piles
    b. The contractor will submit a revised installation alignment plan for the tube-a-manchette installation

May 2013:
1. A workshop was held between PB and BIH in April to establish the required installation geometry
2. The contractor will install the compensation grouting tubes using a diamond drill in the event that the micro piles cannot be avoided

July 2013:
1. As of Monday 7/8/13, 9 tube-a-manchettes have been installed at the Ellis Street shaft. 1 of 9 has encountered a micropile.
2. 1252 Contractor will install tubes as per the current plan. Additional tubes will be installed as required.
3. A 3-D model of the micro piles will be provided to Tutor Perini. A workshop will also be held between PB and Tutor (similar to that held with BIH) to minimize the risk of interference with 1300 compensation grouting tubes.

Risk Mitigation Status
Risk Reference: 214

Risk		Mitigation Strategy
Micro Piles at UMS interfere with Tube-a-manchette installation (60' deep micropiles)	√	1. Provide micro-pile as-built information to contractor 2. Ensure tube-a-manchettes are realigned to be installed clear of micro-piles

September 2013:

1. Risk is becoming a greater concern. Additional mitigation measures need to be identified and implemented.

December 2013:

1. Micropile as-built information was included in 1300 reference documents
2. 1300 Contractor is considering installing TAMs from within station box

June 2014:

1. 5 additional joker holes, 623 extra feet of drilling and pre-condition grouting, lowering of pipes, adjustment to the working platform
2. Contractor claiming $380k, SFMTA current estimate in the order of $210k
3. Discuss updating risk rating.
4. The Program's portion of the cost will be under the estimated $210K.

November 2014:

1. Negotiations for PCC-12 have been completed with BIH. $176k was agreed for Item 5 of PCC-12.
2. Additional costs associated with tube-a-manchette installation were included in PCC-12.
3. The Program will seek reimbursement of these costs from the designer.

December 2014:

1. A letter has been sent to the designed requesting reimbursement of increased costs associated with TAM installation due to the presence of micropiles.

January 2015:

1. Waiting for the comp grout south of headwall, which is the only remaining risk. No impact to the incline piles.

February 2015

1. No new information from last months update . When TPC drills thru the secant pile wall, they may hit the micropiles.

Risk Mitigation Status
Risk Reference: 231

Risk		Mitigation Strategy
Implement 4th Street closure - minimize impact to traffic flow on Perry & Stillman Streets		1. Obtain agreement of Closure

Initial Assessment: 1, 1,1 **Risk Owner:** A. Clifford
Current Assessment: Risk Rating 1 – Construction Risk

Status Log:

November 2014:

1. This risk is included in the mitigation monitoring and reporting action table (MMRP).

December 2014:

1. There have been no complaints from the other businesses, thus far.

January 2015:

1. Street closure took place in December. Currently they have reopened the street at Perry. Stillman is expected to be reopened on February 1st and eastbound before 03/1/15.

February 2015:

1. Correction to January update. One lane of 4th Street was opened on 2/2 to allow Golden Gate buses to access the GGT lot via their usual route. The next Phase (3) is to open one lane of fourth street from Harrison to Bryant allowing access to Stillman Street.
2. Only minor complaints (i.e. housekeeping) have been received from Stillman Street Neighbors.

Risk Mitigation Status
Risk Reference: 232

Risk		Mitigation Strategy
Schedule Mitigation - Ways to mitigate potential delays		1. Establish a clear picture of how far behind we are.

Initial Assessment: X, X,X
Current Assessment: Risk Rating X – 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 first schedule update on February 04, 2015. The update shows an approximate six month delay. Contractor is intimated the delays belong to SFMTA. The Contractor has not submitted a TIA to justify his claim.
2. Their two week look ahead shows them going to a 1-shift/ 5day schedule. The Contractor should be put on notice, to pick up time, activities on the schedule in which the Contractor can work two shifts, they should do so.
3. SFMTA needs to perform an analysis on the schedule.

Risk Mitigation Status
Risk Reference: 233

Risk	Mitigation Strategy
Shotcrete Substitution - in the Stations for final lining	1. Meet and discuss with TPC's senior management what the issues are and the status for clarification.

Initial Assessment: X, X, X
Current Assessment: Risk Rating X **-**

Risk Owner: R. Redmond

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 Cavers 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 authorize to review the shotcrete resubmittal.

Risk Mitigation Status
Risk Reference: 234

Risk		Mitigation Strategy
Sequential Excavation Method at CTS (SEM) - Sequence and in the - Contractor proposes to build the north and south platform simultaneously		1. Designers concurrence on variation of options 2. Presented four options to the Contractor for going forward

Initial Assessment: X, X,X
Current Assessment: Risk Rating X – Construction Risk

Risk Owner: R. Redmond/M. Kobler

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.

Risk Mitigation Status
Risk Reference: 235

Risk		Mitigation Strategy
UMS North Concourse Roof Issues - 12-inch waterline relocation		1.

Initial Assessment: X, X,X
Current Assessment: Construction Risk Rating X

Risk Owner: S. Tisell

Status Log:

February 2015:

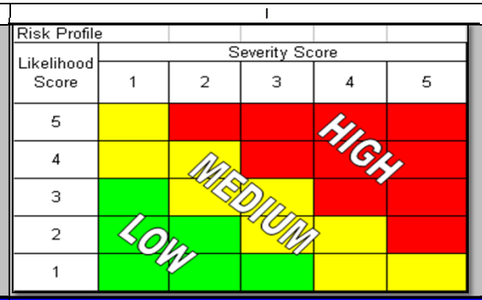
1. Four issues have been identified in the area for work done by the previous 1251Contractor. Those issues work will be address in three phases.
2. The first phase will issue the Contractor a change to raise the MRY duct bank. The realignment of the 12" waterline has been identified.

PROJECT RISK REGISTER

Central Subway Project San Francisco

REV : 40

DATE ISSUED: 02/10/15



	Low (1)	Medium (2)	High (3)	Very High (4)	Significant (5)	Legend
Probability	< 10%	<> 10-50%	> 50%	<> 75% & 90%	>90%	<3 Low
Cost Impact	< $250K	<>$250K - $1M	<> $1M - $3M	<> $3M - $10M	>$10M	3-9 Medium
Schedule Impact	< 1 Month	<> 1 - 3 Months	<> 3-6 Months	<> 6 - 12 Months	> 12 Months	>10 High

RISK RATING = PROBABILITY X (COST IMPACT + SCHEDULE IMPACT)
2
SCORE = PROBABILITY X (COST IMPACT + SCHEDULE IMPACT)

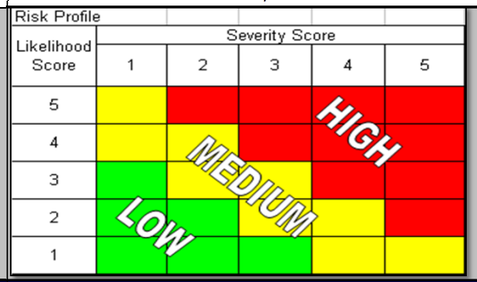
Final Risk ID	Risk Description	Mitigation Description	Risk Category	Probability %	Cost Impact	Schedule Impact	Calc Impact	Calc %	Risk Rating	Score	Status	Must Complete by Date
Underground Tunnel												
115	Jet grouted station end walls are installed by Tunnel contractor. Station Contractor assumes 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
Track Embedded												
Track: Special												
MOS Station												
21	Incomplete cutoff of groundwater at MOS	1. Require additional grouting to limit leakage to permissible level. 2. Include probable grouting work in cost & schedule estimates.	C	1	1	-	1	10%	1	1	Mitigation measure to be made part of the contract documents	4/28/15 MOS1150
22	Public complaints result in unanticipated restrictions on construction at UMS	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. 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. 6. Quickly process and resolve damage and accident claims from the Public. 7. Assumed this work in cost & schedule estimates.	C	1	1	-	1	10%	1	1	Implementation of mitigation measures part of Communication/Outreach plan and certain aspects to be included in the contract documents.	9/16/16 MOS1230
F	Underground obstructions Stations (MOS)	1. Provide adequate allowance for differing site conditions to address unknown underground obstructions. 2. Show field verified obstructions discovered during previous contracts on contract drawings. 3. Make as-built drawings of structures adjacent to the work available to the contractor as reference drawings.	C	4	2	2	2	80%	8	16	Mitigation measures have been implemented.	4/28/15 MOS1150

PROJECT RISK REGISTER

Central Subway Project San Francisco

REV : 40

DATE ISSUED: 02/10/15



	Low (1)	Medium (2)	High (3)	Very High (4)	Significant (5)	Legend
Probability	< 10%	<> 10-50%	> 50%	<> 75% & 90%	>90%	<3 Low
Cost Impact	< $250K	<>$250K - $1M	<> $1M - $3M	<> $3M - $10M	>$10M	3-9 Medium
Schedule Impact	< 1 Month	<> 1 - 3 Months	<> 3-6 Months	<> 6 - 12 Months	> 12 Months	>10 High

RISK RATING = PROBABILITY X (COST IMPACT + SCHEDULE IMPACT)
2
SCORE = PROBABILITY X (COST IMPACT + SCHEDULE IMPACT)

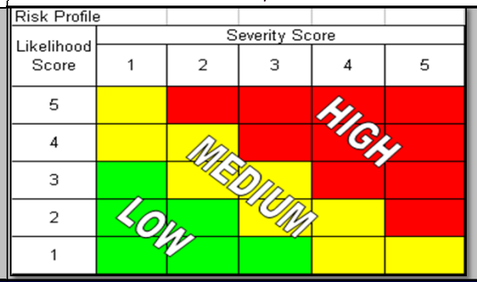
Final Risk ID	Risk Description	Mitigation Description	Risk Category	Probability %	Cost Impact	Schedule Impact	Calc Impact	Calc %	Risk Rating	Score	Status	Must Complete by Date
27	Loss of business results in unanticipated restrictions on construction at YBM	1. Public outreach. 2. Maintain regular and open communications so Merchants know construction plans and progress at all times. 3. 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. 4. Require barriers to protect pedestrians and shield them from noise and dirt from construction. 5. Work with MOEWD to increase cleanup of the area and assist pedestrians across streets. 6. Include this work in cost & schedule estimates.	C	1	2	1	2	10%	2	3	Mitigation measures to be implemented and to the extent possible requirements will be written into contract documents to minimize disruptions to businesses.	4/28/15 MOS1150
F	Underground obstructions Stations (UMS)	1. Provide adequate allowance for differing site conditions to address unknown underground obstructions. 2. Show field verified obstructions discovered during previous contracts on contract drawings. 3. Make as-built drawings of structures adjacent to the work available to the contractor as reference drawings.	C	4	2	2	2	80%	8	16	Mitigation measures have been implemented.	8/12/15 UMS 1320
28	Incomplete cutoff of groundwater at UMS	1. If needed, perform grouting to mitigate the intrusion of groundwater. 2. Include in cost & schedule estimates.	C	1	2	1	2	10%	2	3	Mitigation measures in the form of consolidation grouting to be included in contract documents	8/12/15 UMS1320
33	Damage to utilities at UMS causes delay to construction and/or consequential cost. (very close to walls adjacent to relocated utility trenches)	1. Intensive utility coordination and investigation. 2. Relocate utilities out of the way of construction wherever possible. 3. Show utilities on reference plans. 4. Have utility contact information and procedure on plans. 5. Have contingency repair/restoration plans. 6. Include probable impacts to schedule & cost in estimates.	C	2	1	1	1	35%	2	4	Although mitigation measure have been fully implemented, Increased probability due to proximity of new pile design to existing relocated utilities.	7/19/16 UMS1410
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	2	3	2	3	35%	5	10	Mitigation measures to be implemented and to the extent possible requirements will be written into contract documents to minimize disruptions to businesses.	9/7/16 UMS1430

PROJECT RISK REGISTER

Central Subway Project San Francisco

REV : 40

DATE ISSUED: 02/10/15



	Low (1)	Medium (2)	High (3)	Very High (4)	Significant (5)	Legend
Probability	< 10%	<> 10-50%	> 50%	<> 75% & 90%	>90%	<3 Low
Cost Impact	< $250K	<>$250K - $1M	<> $1M - $3M	<> $3M - $10M	>$10M	3-9 Medium
Schedule Impact	< 1 Month	<> 1 - 3 Months	<> 3-6 Months	<> 6 - 12 Months	> 12 Months	>10 High

RISK RATING = PROBABILITY X (COST IMPACT + SCHEDULE IMPACT)
2
SCORE = PROBABILITY X (COST IMPACT + SCHEDULE IMPACT)

	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
111	35	Ground support structure causes groundwater table to rise which results in leakage into adjacent structures.(new structure might create a dam that results into leaks into new and existing structures)	1. Perform detailed hydrogeologic modeling and analysis. 2. Monitor groundwater table at multiple locations and passive measures as necessary to mitigate. 3. Reference the Tech memo in contract documents. 4. Include probable costs in estimate.	C	1	2	-	1	10%	1	2	Mitigation measures incorporated in design based on updated Hydrogeologic analysis and report	9/7/16 UMS1430
112	36	Damage to buildings or utilities as a result of heave from jet grouting at UMS.	Utilize tangent piles combined with surface jet grouting.	C	1	1	-	1	10%	1	1	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
159	J	Macy's entrance conflict with new piles	1. Show known obstructions shown on as-built drawings on contract drawings. 2. Make as-built drawings available to contractor as reference drawings. 3. Have contractor field verify obstruction shown on as-built drawings and contract drawings	C	3	1	1	1	50%	3	6	Known obstructions are shown on the ES drawings. Allowance for differing site conditions added to UMS Station contract.	1/23/14 UMS1060
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												
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

PROJECT RISK REGISTER

Central Subway Project San Francisco

REV : 40

DATE ISSUED: 02/10/15

Risk Profile

Likelihood Score	Severity Score 1	2	3	4	5
5				HIGH	
4			MEDIUM		
3					
2	LOW				
1					

	Low (1)	Medium (2)	High (3)	Very High (4)	Significant (5)	Legend
Probability	< 10%	<> 10-50%	> 50%	<> 75% & 90%	>90%	<3 Low
Cost Impact	< $250K	<>$250K - $1M	<> $1M - $3M	<> $3M - $10M	>$10M	3-9 Medium
Schedule Impact	< 1 Month	<> 1 - 3 Months	<> 3-6 Months	<> 6 - 12 Months	> 12 Months	>10 High

RISK RATING = PROBABILITY X (COST IMPACT + SCHEDULE IMPACT)
2

SCORE = PROBABILITY X (COST IMPACT + SCHEDULE IMPACT)

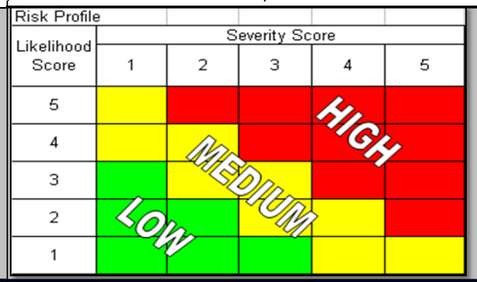
	Final Risk ID	Risk Description	Mitigation Description	Risk Category	Probability %	Cost Impact	Schedule Impact	Calc Impact	Calc %	Risk Rating	Score	Status	Must Complete by Date
167	48	Incomplete drawdown of groundwater. (inside of box and inside of caverns)	1. Require additional grouting to limit leakage 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
173	50	CTS station contractor delayed by tunnel contractor since station platform construction cannot start until tunnels have been finished.	1. Include provisions in CTS contract identifying the potential waiting period for tunnel contractor. 2. Actively monitor progress towards schedule milestones	C	2	1	2	2	35%	3	6	Constraints on CTS contractor added to specification "Work Sequence and Constraints"	12/16/13 TUN1122
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
183	F	Underground obstructions stations (CTS)	1. Provide adequate allowance for differing site conditions to address unknown underground obstructions. 2. Make as-built drawings of structures adjacent to the work available to the contractor as reference drawings	C	4	2	2	2	80%	8	16	Mitigation measures have been implemented.	10/9/17 CTS1500
214	U	Proximity at junction of head house boundary wall and school yard may result in relocation of school yard during wall construction		C	1	1	1	1	10%	1	2	Project configuration changed to eliminate encroachment. Risk converted to Construction risk from Risk 55.	8/16/13 CTS1010
216	General												
218	Demolition, Clearing , Earthwork												
220	Site Utilities, Utility relocations												
230	Hazmat, Contaminated Material												
234	Environmental Mitigations												
236	66	Archeological/Cultural findings during construction increases schedule and/or cost.(Moscone) AROUND 10%	1. Provide on-call Archeologist. 2. Provide allowance and procedure in contract for Archeological/Cultural discoveries.	C	3	1	1	1	50%	3	6	Mitigated - Current exposure only to those amount above those currently identified	4/28/15 TUN1150
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
238	68	Archeological/Cultural findings during construction increases schedule and/or cost. (CHINA TOWN) …AROUND 10%	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	10/9/17 CTS1500
240	Site Structure incl. sound walls												
242	Auto/bus/van access ways, roads												

PROJECT RISK REGISTER

Central Subway Project San Francisco

REV : 40

DATE ISSUED: 02/10/15



	Low (1)	Medium (2)	High (3)	Very High (4)	Significant (5)	Legend
Probability	< 10%	<> 10-50%	> 50%	<> 75% & 90%	>90%	<3 Low
Cost Impact	< $250K	<>$250K - $1M	<> $1M - $3M	<> $3M - $10M	>$10M	3-9 Medium
Schedule Impact	< 1 Month	<> 1 - 3 Months	<> 3-6 Months	<> 6 - 12 Months	> 12 Months	>10 High

RISK RATING = PROBABILITY X (COST IMPACT + SCHEDULE IMPACT)
2
SCORE = PROBABILITY X (COST IMPACT + SCHEDULE IMPACT)

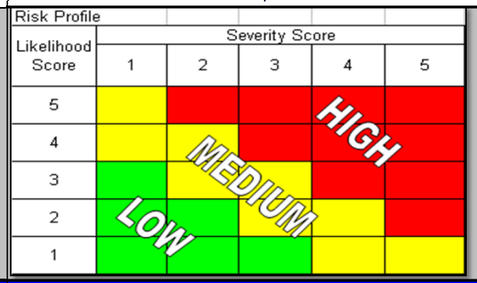
Final Risk ID	Risk Description	Mitigation Description	Risk Category	Probability %	Cost Impact	Schedule Impact	Calc Impact	Calc %	Risk Rating	Score	Status	Must Complete by Date
Train Control and Signals												
72	Interface new Signaling and Train Control system to existing at Fourth and King	Connect 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
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	1	1	1	35%	2	4		7/27/12 FDS 1940
Traffic signals & Crossing Protn.												
Fare Collections Systems												
Purchase or lease of Real Estate												
79	Delay in obtaining tunnel easements (3 #) (goes to condemnation) - Costs of ROW may cost more than expected	1. Engage Owners in negotiations as soon as possible. 2. PM/CM to provide real estate specialists to facilitate.	R	1	1	-	1	10%	1	1	Right of possession obtained on all three parcels. Cost agreement reached with 1455 Stockton & 801 Market.	9/7/2012
Reloc. of Household or Business												
Vehicles												
Preliminary Engineering												
95	Contractor default during construction impacts schedule. (key sub-contractor)	Assist Bonding company in transition and to maintain schedule.	C	1	2	2	2	10%	2	4		11/17/17 STS 1500
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
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
102	Late finish of early contract delays later contracts and extends PM / CM and incurs additional costs	1. Actively manage contracts and include incentive provisions for early completion in critical contracts. 2. Add buffer float to critical path to actively manage schedule contingency	C	2	1	2	2	35%	3	6	LONP 1 & 2 initiated to reduce this risk. See Risk 86. The mitigation of risks associated with early contracts will address this risk. Risk rating reduced due to mitigation measures implemented	12/30/20 MS 0010
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
Insurance, permits etc.												
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

PROJECT RISK REGISTER

Central Subway Project San Francisco

REV : 40

DATE ISSUED: 02/10/15



	Low (1)	Medium (2)	High (3)	Very High (4)	Significant (5)	Legend
Probability	< 10%	<> 10-50%	> 50%	<> 75% & 90%	>90%	<3 Low
Cost Impact	< $250K	<>$250K - $1M	<> $1M - $3M	<> $3M - $10M	>$10M	3-9 Medium
Schedule Impact	< 1 Month	<> 1 - 3 Months	<> 3-6 Months	<> 6 - 12 Months	> 12 Months	>10 High

RISK RATING = PROBABILITY X (COST IMPACT + SCHEDULE IMPACT)
2
SCORE = PROBABILITY X (COST IMPACT + SCHEDULE IMPACT)

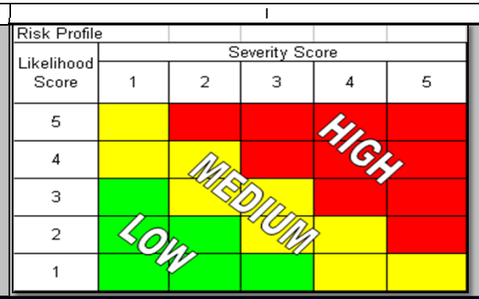
Final Risk ID	Risk Description	Mitigation Description	Risk Category	Probability %	Cost Impact	Schedule Impact	Calc Impact	Calc %	Risk Rating	Score	Status	Must Complete by Date
104	CPUC approval at Grade Crossing for G0164d takes longer to negotiate / obtain than schedule allows	1. Obtain Grade Crossing 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
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
106	Risk of Labor dispute delaying the work.	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
Unallocated Contingency												
111	Major Earthquake stops work	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
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
196	The process of acquiring station licenses: acquisition/condemnation could significantly delay schedule and cost more than that presently planned.	1. Continue to negotiate with building owners 2. Required Notices and Appraisals to be completed 3. Commence condemnation process with City Attorneys	C	1	1	1	1	10%	4	2		
202	Cargo Preference (Ship America) must solicit U.S.- flag carriers. Civilian Agencies Cargo = at least 50% (governed by Cargo Preference Act of 1954	1. Require Ship America compliance agreement first tier contractors and subcontractors	C	1	1	1	1	10%	1	2		
204	AT&T Vault - New Sewer Work south of Bryant	1. Continue negotiations/coordination with utility owners. 2. Schedule analysis to confirm coordination	C	1	2	4	3	10%	3	6		
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	3	1	1	1	50%	3	6		
211	Differing site conditions encountered during ground freezing of Cross Passage 5 results in increased costs.	1. Contractor has submitted a 'no cost, no schedule' PCC for ground freezing 2. Need early review of work plan, and identification of entity that will perform the work 3. Review Plans 4. Monitor work at CP5 - to ensure no addl cost are incurred by SFMTA 5. Review plans for overcoming incident	C	1	5	3	4	10%	4	8		Retired 12/16/14 Reopened 01/13/15
212	UMS Inclined piles – 8" clearance between piles and tunnel results in damage or safety issues within the tunnel	1. Establish 1252 and 1300 contract requirements to construct within acceptable tolerances 2. Workshop to be held with BIH to discuss hold points during construction.	C	1	5	3	4	10%	4	8		

PROJECT RISK REGISTER

Central Subway Project San Francisco

REV : 40

DATE ISSUED: 02/10/15



	Low (1)	Medium (2)	High (3)	Very High (4)	Significant (5)	Legend
Probability	< 10%	<> 10-50%	> 50%	<> 75% & 90%	>90%	<3 Low
Cost Impact	< $250K	<>$250K - $1M	<> $1M - $3M	<> $3M - $10M	>$10M	3-9 Medium
Schedule Impact	< 1 Month	<> 1 - 3 Months	<> 3-6 Months	<> 6 - 12 Months	> 12 Months	>10 High

RISK RATING = PROBABILITY X (COST IMPACT + SCHEDULE IMPACT)
2
SCORE = PROBABILITY X (COST IMPACT + SCHEDULE IMPACT)

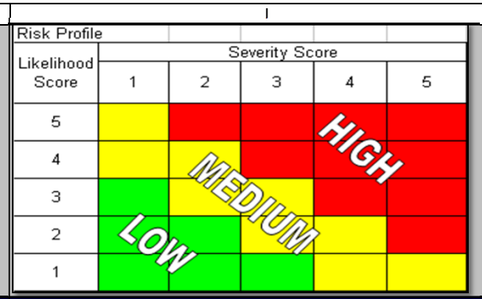
	Final Risk ID	Risk Description	Mitigation Description	Risk Category	Probability %	Cost Impact	Schedule Impact	Calc Impact	Calc %	Risk Rating	Score	Status	Must Complete by Date
339	214	Micro Piles at UMS interfere with Tube-a-manchette installation (60' deep micropiles)	1. Provide micro-pile as-built information to contractor 2. Realign tube-a-manchettes clear of micro-piles	C	3	1	1	1	50%	3	6		
340	215	DPW Excavation permit reviews delay contract works	1. Obtain a blanket excavation permits from DPW covering the area of work for 1253, 1254, 1255, 1256	C	2	1	1	1	35%	2	4		
341	216	Olivet building potential construction impact	1. Reach out to building owner and keep him abreast of CS construction activities.	C	1	1	2	2	10%	2	3		
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.	
344	219	Clearance between YBM slurry wall and constructed tunnels results in a strike causing safety or structural concerns	1. Program Safety Manager to prepare a comprehensive safety plan to address this issue 2. Program to prepare a written position/response to concerns raised regarding this issue	C	-	-	-	-	0%	-	-		Retired 12/16/14
347	222	ARGUS Monitoring Software - Sharing Instrumentation for CN1252 and CN1300	1. Outline responsibilities for each contractor (1252 & 1300)	C	3	3	1	2	50%	6	12		
348	223	Contamination during dewatering (CTS)	1. Review contract requirements .	C	2	3	1	2	35%	4	8		
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	5	1	2	2	90%	8	15		
350	225	Ellis Street Utilities (unknown underground utilities)	1. Proactive investigation into identify the issue 2. Engineers should review and make a recommendation 3. Early review of potholing information for potential conflicts 4. Put the utilities on red alert	C	5	2	2	2	90%	10	20		
351	226	4th and King Street - Potential time for planned work shutdown - Contractor not able to perform the work in the manner prescribed	1. Identify schedule of potential time for planned work shutdown 2. Identify better traffic patterns 3. Pursue 4th & King option to achieve additional 3-6mos on the schedule 4. Review Giants and Warriors schedule for home games	C	3	3	3	3	50%	9	18		
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.	C	1	1	1	1	10%	1	2		
354	229	Pre Revenue Testing		C									

PROJECT RISK REGISTER

Central Subway Project San Francisco

REV : 40

DATE ISSUED: 02/10/15



	Low (1)	Medium (2)	High (3)	Very High (4)	Significant (5)	Legend
Probability	< 10%	<> 10-50%	> 50%	<> 75% & 90%	>90%	<3 Low
Cost Impact	< $250K	<>$250K - $1M	<> $1M - $3M	<> $3M - $10M	>$10M	3-9 Medium
Schedule Impact	< 1 Month	<> 1 - 3 Months	<> 3-6 Months	<> 6 - 12 Months	> 12 Months	>10 High

RISK RATING = PROBABILITY X (COST IMPACT + SCHEDULE IMPACT)

2

SCORE = PROBABILITY X (COST IMPACT + SCHEDULE IMPACT)

	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
355	230	Post Revenue Testing		C									
356	231	Implement 4th Street closure - minimize impact to traffic flow on Perry & Stillman Streets	1. Obtain agreement of closure	C	1	1	1	1	10%	1	2		
357	232	Schedule Mitigation - Ways to mitigate potential delays	1. Establish a clear picture of how far behind we are.	C									
358	233	Shotcrete Substitution - in the Stations for final lining	1. Meet and discuss with TPC's senior management what the issues are and the status for clarification.	C									
359	234	Sequential Excavation Method at CTS (SEM) Sequence - Contractor proposes to build the north and south platform simultaneously	1. Designers concurrence on variation of options 2. Presented four options to the Contractor for going forward	C									
360	235	Sewer work after lowering of tunnel - Damage / settlement 3x 5' to old brick sewer running parallel to tunnel alignment		C									