


SAN FRANCISCO PUBLIC UTILITIES COMMISSION INFRASTRUCTURE CONSTRUCTION MANAGEMENT PROCEDURES	
SECTION: SFPUC INFRASTRUCTURE CONSTRUCTION MANAGEMENT	APPROVED: 
PROCEDURE NO: 014	DATE: 6/7/2019
TITLE: RISK MANAGEMENT PLAN PREPARATION, APPROVAL AND IMPLEMENTATION	REVISION: 1

1.0 Policy

The Risk Management Plan is a project-specific strategic document prepared by the project CM team and approved by the City, for all projects associated with major capital improvement programs and other infrastructure projects, as required by the CMB Manager, that are under construction. The Risk Management Plan presents the process, methods and responsible parties required to identify, assess, evaluate, prioritize, mitigate, report on and monitor potential impacts to the project’s budget, schedule, quality, environmental conditions, human health & safety, and community impacts.

This SFPUC Infrastructure CM Procedure applies to all personnel working on the SFPUC Infrastructure projects during construction to the extent that their work is affected by this CM Procedure and does not conflict with specific SFPUC policies or the Contract under which the Work is executed.

2.0 Description

This SFPUC Infrastructure CM Procedure identifies the guidelines and process for Risk Management on SFPUC Infrastructure projects during the construction phase in accordance with the SFPUC Infrastructure CM Plan. This CM Procedure covers:

- Risk Management Plan Development
 - Risk Planning
 - Risk Management Plan Preparation
 - Risk Management Plan Submittal and Approval

- Risk Management Plan Implementation and Reporting
 - Risk Mitigation Implementation
 - Risk Mitigation Reporting

3.0 Definitions

This section defines the risk management terms used in this CM Procedure.

3.1 Active Risk Manager (ARM)

An enterprise, web based, software application used as a tool by the Risk Analyst to assist in managing risk and performing program and project risk analysis.

3.2 Baseline Risk Register

The final risk register created by the Project Risk Group (see Section 3.10), during the Baseline Risk Register Development process (see Section 5.1.2), and generated from ARM.

3.3 Monthly Risk Management Meeting

A monthly meeting conducted by the RE or a designated CM team member, with or without the Project Risk Group, to update the Risk Register. This meeting may be scheduled in conjunction with a scheduled Weekly Progress Meeting when a majority of the Project Risk Group members will be present.

3.4 Risk

A Project Risk is an uncertain event, which could be a threat or an opportunity and if it occurs, the result may have a positive or a negative impact on the project or program.

3.5 Risk Assessment

Risk Assessment is the formalized process of identifying Risks and evaluating their Probability of Occurrence (P) and Severity of Impact (S).

3.6 Risk Assessment Workshop

The Risk Assessment Workshop meeting is conducted by the RE with the attendance and support of the Project Risk Group. The objective of the meeting is to prepare the Risk Register by identifying and assessing risks and developing risk plans and mitigation actions for the project.

3.6.1 The Project Risk Group shall include at a minimum:

- Resident Engineer
- Risk Team (the Risk Manager and/or the Risk Analyst)
- Client/Operations Representative
- Project Engineer
- Lead Construction Inspector

- Outreach Liaison
- Environmental Inspector and/or Environmental Monitor
- Field Contracts Administrator
- Construction Safety Manager
- Construction Scheduler
- Construction Estimator
- Construction Contractor

3.7 Risk Management Plan

A strategic plan prepared by the CM team to define a strategic risk approach and plan which identifies, assesses, evaluates, mitigates, and manages risks for the purpose of significantly increasing the probability of delivering a successful project in order to meet project budget, schedule, quality, environmental conditions, health and safety, and community requirements. Please see Attachment 014-5 for required Risk Management Plan content.

3.8 Risk Mitigation Plan

A Risk Mitigation Plan is the strategy to reduce the probability of a risk event occurrence and/or a risk consequence below an acceptable threshold. The strategy may include multiple actions in a risk mitigation plan, and each action may have a different action owner, action start and action end dates.

3.9 Risk Planning

Risk Planning is any pre-Risk Assessment Workshop activity performed to prepare the Project Risk Group and the RE. This typically includes a risk identification questionnaire and results in the development of a preliminary Risk Register to be used in the Risk Assessment Workshop. It facilitates the identification and analysis of project risks and their attributes by attendees prior to the Risk Assessment Workshop.

3.10 Risk Register

A document that includes information developed from the Risk Assessment Workshop. It will be used to identify, assess, analyze, and clarify ownership of risks and define how risks are to be strategized, controlled, mitigated and managed.

3.11 3-Point Estimate

A 3-Point estimate is prepared to measure the cost impact of every risk. The three-point estimates are made up of the following three values:

- the optimistic estimate (Low)
- the most likely estimate (Mid-Range)
- the pessimistic estimate (High)

4.0 **Responsibilities**

4.1 **Action Owner (Mitigation)**

The Action Owner is responsible for the execution and follow-through of his/her assigned action(s) in the Risk Register. The Action Owner reports to the Risk Plan Owner for his/her assigned risk.

4.2 **Contractor**

The Contractor is responsible to deliver the project as specified in his contract. The Contractor executes his assigned Risk Mitigation Measures to reduce or eliminate potential Risks.

4.3 **Program CM Consultant (PCM)**

The PCM is responsible for reviewing the Risk Management Plan, Baseline Risk Register, monthly Risk Register updates, and monthly SFPUC Infrastructure Top 10 Risk Register for compliance with data quality requirements as established in this procedure. The PCM shall work with the RE to develop 3-point cost estimates for each SFPUC risk in developing the Baseline Risk Registers, if needed.

4.4 **Risk Manager**

The Risk Manager is responsible for overseeing the development and implementation of the Risk Management Program. He or she works with the Project Management Bureau (PMB) Manager to assess and report Program Risk to stakeholders and coordinates with the PM, CM, RE, and PCM to ensure the Risk Management Plan(s) are implemented accordingly.

4.5 **Resident Engineer (RE)**

The RE leads the Risk Management Plan development, monthly update, approval, implementation and control.

4.6 **Project Risk Group**

The Project Risk Group, led by the RE or designated CM team member, participates in preparation and implementation of the Risk Management Plan during the project construction phase.

4.7 **Construction Manager (CM)**

The CM reviews and comments on the project Risk Management Plan and reporting.

The CM is also responsible for reviewing and commenting on the monthly update report, which includes the SFPUC Infrastructure Top 10 Risk Register.

4.9 **Project Manager (PM)**

The PM reviews and approves the project Risk Management Plan and monthly update report, which includes the SFPUC Infrastructure Top 10 Risk Register. He or she may designate the responsibility to the CM.

4.10 Risk Analyst

The Risk Analyst serves as the administrator of ARM. He or she also works with the CM teams to update the Risk Register and perform risk analysis. He or she will facilitate the development and implementation of the Risk Register for the CM team from the perspective of ARM and risk management best practices.

4.11 Risk Plan Owner

The Risk Plan Owner is responsible for executing the Risk Plan by monitoring the progress of the Action Owners with their proposed actions. The Risk Plan Owner reports the progress of the actions to the RE at the Monthly Risk Management Meeting.

4.12 Risk Management team (RM team)

The RM team is comprised of the CMB Manager, Program Risk Manager, and Program CM Consultant.

5.0 Implementation

5.1 Risk Management Plan Preparation and Submittal

5.1.1 Risk Planning

5.1.1.1 The RE identifies and notifies the Project Risk Group attendees of the Risk Assessment Workshop.

5.1.1.2 The RE prepares and distributes a Pre-Risk Assessment Workshop questionnaire which asks the attendees to identify potential risks. (Attachment 014-3)

5.1.1.3 The Project Risk Group fills out the questionnaire and returns the questionnaire to the RE prior to the Risk Assessment Workshop.

5.1.1.4 The RE drafts the potential risks received from the Project Risk Group into a draft Risk Register (in Column C – Risk Description) using the standard SFPUC Infrastructure Project Risk Register template (Attachment 014-1).

5.1.2 Risk Management Plan/Baseline Risk Register Development

5.1.2.1 The RE is responsible for developing a Risk Management Plan. The Risk Management Plan includes the project description, major risks, and the approach for identifying, analyzing, and controlling risk. The Risk Management Plan must specify main roles and responsibilities associated with the mitigation and avoidance of project risk. The Baseline Risk Register, which is developed during the Risk Assessment Workshop, is a component of the Risk Management Plan. The draft Risk Management Plan must be

prepared in parallel with the development of 3-pt estimates. Please see Attachment 014–4 Risk Management Plan Required Content for a complete list of required content.

5.1.2.2 Risk Assessment Workshop

5.1.2.1.1 The objective of this workshop is to:

- Identify all the risks to the project.
- Assess the probability of occurrence of each risk.
- Evaluate the potential impact to cost and schedule of each risk.
- Determine a strategy and an action plan to reduce the probability of each risk occurring and/or reduce the severity of the impact to the project should the risk occur and identify potential action items.

5.1.2.1.2 Workshop Process

5.1.2.1.2.1 The RE presents the draft of potential risks, Probability Scale, and Severity of Impact Scales for Cost and Schedule for use in the Workshop.

5.1.2.1.2.2 The RE calls for any additional risks. If there are additional risks, the RE will record them in Column C – Risk Description.

5.1.2.1.2.3 The RE may divide the session into smaller Risk Subgroups to perform specific event Risk Assessment.

5.1.2.1.2.4 The RE conducts and records the data as it is discussed and agreed to by the Project Risk Group. The Program Risk Manager or the Risk Analyst may facilitate the meeting upon request.

5.1.2.3 Baseline Risk Register Development: The RE prepares a draft Baseline Risk Register which documents the data collected from the Workshop and includes additional required information. Please refer to Attachment 014-1 Risk Register Template - Column Notes for detailed guidance on each column of the Risk Register.

- 5.1.2.3.1 Note that Column L - Severity of Impact to Cost is assessed for **SFPUC risks only**.
- 5.1.2.3.2 Note that Column N – Risk Score will be automatically calculated based on the qualitative input made by the Project Risk Group and recorded by the RE in Columns K, L, and M. See Attachment 014-2 for the Risk Score Matrix example.
- 5.1.2.4 The RE sends the draft Baseline Risk Register to the PCM and RM team for review.
- 5.1.2.5 The PCM and RM team will review it for Quality Assurance in order to establish general conformance to the prescribed format and content for the Risk Register as defined in this procedure and attachments.
- 5.1.2.6 The PCM and RM team will compile comments and send them to RE for incorporation into the 2nd draft Risk Register.
- 5.1.2.7 The Project Risk Group will develop 3-point cost estimates for cost impacts to the SFPUC risks only and a scoring rationale to the RE for review and approval.
- 5.1.2.8 The RE will forward the draft Baseline Risk Register to the PCM and RM team. The PCM and RM team will review the draft Baseline Risk Register and return to the RE.
- 5.1.2.9 The RE reviews any comments provided by the PCM and RM team and updates the data as necessary. The RE forwards the final draft Baseline Risk Register to the Program Risk Manager for approval.
- 5.1.2.10 Once approved, the Risk Analyst loads the final Baseline Risk Register into ARM and posts the Baseline Risk Register on the SFPUC network drive and notifies the RE with an email.
- 5.1.2.11 The RE will attach the Risk Register in CMIS Risk BP.
- 5.1.2.12 The RE prepares and finalizes the content required for the Risk Management Plan, as indicated in Attachment 014-3 and submits it to the PCM and Program Risk Manager for review and attach a copy in the CMIS Risk BP.
- 5.1.3 Risk Management Plan Submittal and Approval
 - 5.1.3.1 The RE submits the Risk Management Plan to the PCM for review.

- 5.1.3.2 The PCM will forward the Risk Management Plan to the CM with a copy to the Program Risk Manager with a recommendation for approval.
- 5.1.3.3 The CM reviews the final Risk Management Plan.
- 5.1.3.4 The Construction Manager forwards the final Risk Management Plan to the PM for final approval and implementation.

5.2 Risk Management Plan Implementation and Reporting

5.2.1 Risk Mitigation Implementation

- 5.2.1.1 The RE is responsible for monitoring and updating the Risk Management Plan including the Risk Register.

5.2.2 Risk Mitigation Reporting

- 5.2.2.1 **Monthly Update Meeting:** The RE will conduct a monthly meeting with the Project Risk Group to update the Risk Register. The RM team may provide support as requested. On a quarterly basis, the Program Risk Manager and/or Risk Analyst will attend the Risk Register review and update meeting at the project field office.
- 5.2.2.2 The RE must submit electronically the updated Risk Register to the Risk Analyst within three (3) business days of the Monthly Update Meeting. The RE is not required to submit an update electronically for the Quarterly meeting which the RM team attends. The RE must change font color (red) for all changed data in the cells of the excel spreadsheet or use track changes for electronic updates.
- 5.2.2.3 Upon completion of the update, the Risk Analyst will update the risk data based on the electronic submissions in CMIS and post to the SFPUC network drive the revised Risk Register. The Risk Analyst will notify the team with an email when the Risk Register is made available on the S drive. The RE will also update the Risk Register and any other Risk documents in CMIS Risk BP.
- 5.2.2.4 The RE must review and provide any additional comments to the Risk Analyst within two (2) business days of the notification. If comments are not provided within the time frame, changes will be reflected in the next monthly update.
- 5.2.2.5 Once all project updates are completed for a facility, the Risk Analyst will post to the network drive the SFPUC Infrastructure Top 10 Risk Register for the CM and/or the PM. The Risk Analyst will notify the team with an email when the Risk Register is available on the Network drive. Any comments must be provided to the project team for

their approval within two (2) business days. Any comments provided after two (2) business days will be reflected in the following monthly update.

- 5.2.2.6 All relevant statistical data used for the Monthly Construction Report will be provided to the RE as part of the Risk Register update. This statistical information will be used by the RE to fill out the Monthly Construction Progress Report risk section. The RE will attach the revised Risk Register to the Monthly Construction Progress Report. The PCM reviews and provides comments on Monthly Construction Progress Report Risk Register to the RE for update in the following month.
- 5.2.2.7 The RE will use the revised Risk Register for their next Monthly Update meeting. The RE must use the latest version of the Risk Register posted on the network drive.
- 5.2.2.8 The Risk Analyst will provide the Program Risk Manager with the SFPUC Infrastructure Top 10 Risks for review prior to PCM review. The PCM will review and provide comments within one (1) business day to the Program Risk Manager.
- 5.2.2.9 The RE will input all the information pertaining to the Risk Register and its updates into the CMIS.

6.0 Other Procedural Requirements

None

7.0 References

7.1 Technical Specifications

None

7.2 SFPUC Infrastructure CM Procedures

None

7.3 Others

A Guide to Project Management Body of Knowledge, latest Edition published by PMI, Project Risk Management.

8.0 Attachments

- 014 - 1 Risk Register Template
- 014 - 2 Probability Scale, Severity of Impact Scales to Cost and Schedule, and Risk Score Matrix
- 014 - 3 Pre-Risk Assessment Workshop Questionnaire
- 014 - 4 Risk Management Plan Required Content
- 014 – 5 Revision Control Log

Attachments 014 – 1 Risk Register Template

PROJECT: -enter project number and title>
 CONTRACTOR: -enter name here>
 PROJECT CM: -enter name here>
 CONSULTANT: -enter name here>

-enter project title here>
 Project ID _____
 (Original Contract Value: \$ _____ M, _____ Days), NTP: 09/26/2019, Final
 Completion: / /
 Report Cutoff Date: / /

Status Update: _____
 Updated By: _____
 Project Team

PROJECT RISK REGISTER



- Date Key:
1. Trigger Date (Column K) within 30 Days
 2. Expiration Date (Column L) within 30 Days
 3. Active Start Date (Column Z) within 90 Days
 4. Active Action End Date (Column AA) within 90 Days
 1. Action Start Date (Column Z), Overview and Action Status (Column AQ) is Proposed
 2. Active Action End Date (Column AA)
 3. Open or Mitigated Risk Expiration Date (Column L), Overview
 4. Risk (Column B) with Last Active Action Overview
 5. Open Risk Has Actions All Completed
 6. Action Status (Column AQ) is Active but Action Start date (Column Z) is in the future or Action End date (Column AA) is in the past
 7. Action End date (Column AA) is greater than Expiration Date (Column L)

RISK IDENTIFICATION & CAUSE																CURRENT ASSESSMENT											MITIGATION					
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC				
Risk ID	Risk Category	Risk Description (What/How/Where)	Project Title	Location	Cause	Effect	Risk Plan Owner	Risk Status	Risk Trigger Date	Expiration Date	Probability Occurrence (%)	Most Likely	Min	Max	Min (Days)	Max (Days)	Min (Days)	Max (Days)	Risk Score	Scoring Intermediate	Strategy	Risk Plan	Actions Items	Action Owner	Action Start	Action End	Action Completion	Action Status				

Risk Management Status for "Open & Mitigated" Risks:

Active Risks	No.	Action Item Type	No.	Risk Level	No.	Risk Category	Risk Count
Open	11	Active (In Progress)	17	Extreme	0	Contractual	1
Mitigated	0	Overdue	1	Very High	0	Technical	6
Total	11			High	1	Operations	2
				Medium	3	Regulatory	0
				Low	3	Community	0
					1	Management	0
						Quality	0
						Safety	1
						Security	0
						Market	0
						Continuity	0
						Cost	0
						Cost	0
						Manufacturing	0
						Delays	0
						Design Scope	0
						Environmental/ CEQA	0
						Legal	0
						Operations/ Continuity	0
						Organization and Decision Making	0
						Permitting	0
						Procurement/ Contracting	0
						Site Acquisition	0
						Total Distinct Risk Count	10

Risk Level	No.
Extreme	0
Very High	0
High	1
Medium	3
Low	1

Action Item Type	No.
Active (In Progress)	17
Overdue	1

Active Risks	No.
Open	11
Mitigated	0
Total	11

Attachment 014 – 2 Probability Scale, Severity of Impact Scales to Cost and Schedule and Risk Score Matrix

SSIP SEP Risk Rating Assessment

Project Name:

IMAPCT						
		< 1000 days	> or = 1000 days	<\$250M	> or = \$250M	
Impact Category	Schedule Impact Range (%)	Schedule Impact Range (time)	Budget Impact Range (%)	Budget Impact Range (\$)	Other Catastrophic Risks Health or Safety Regulatory Violation Agency Reputation Negative Publicity	
Catastrophic	> 10% of Original Duration	3 months or more	> 1% of Original Cost	\$2M or over		
Critical	8% to 10% of Original Duration	2 to 3 months	0.8% to 1% of Original Cost	\$1M to \$2M		
Serious	6% to 8% of Original Duration	1.5 to 2 months	0.6% to 0.8% of Original Cost	\$500K to \$1M		
Moderate	4% to 6% of Original Duration	1 to 1.5 months	0.4% to 0.6% of Original Cost	\$200K to \$500K		
Marginal	<4% of Original Duration	Less than a month	<0.4% of Original Cost	Less than \$200k		

PROBABILITY	Probable	High Probability	Very High Probability	100%
		Medium Probability	High Probability	85%
	Improbable	Low Probability	Medium Probability	65%
		Very Low Probability	Low Probability	35%
			Very Low Probability	15%
			Very Low Probability	0%

EXPECTED VALUE

		Very Low Probability Catastrophic Impact	Low Probability Catastrophic Impact	Medium Probability Catastrophic Impact	High Probability Catastrophic Impact	Very High Probability Catastrophic Impact
IMPACT	Catastrophic	Very Low Probability Catastrophic Impact	Low Probability Catastrophic Impact	Medium Probability Catastrophic Impact	High Probability Catastrophic Impact	Very High Probability Catastrophic Impact
	Critical	Very Low Probability Critical Impact	Low Probability Critical Impact	Medium Probability Critical Impact	High Probability Critical Impact	Very High Probability Critical Impact
	Serious	Very Low Probability Serious Impact	Low Probability Serious Impact	Medium Probability Serious Impact	High Probability Serious Impact	Very High Probability Serious Impact
	Moderate	Very Low Probability Moderate Impact	Low Probability Moderate Impact	Medium Probability Moderate Impact	High Probability Moderate Impact	Very High Probability Moderate Impact
	Marginal	Very Low Probability Marginal Impact	Low Probability Marginal Impact	Medium Probability Marginal Impact	High Probability Marginal Impact	Very High Probability Marginal Impact
		Very Low	Low	Medium	High	Very High

PROBABILITY

Attachment 014 - 3 Pre-Risk Assessment Workshop Questionnaire

Preliminary Risk Assessment by: (enter name here)					
RISK IDENTITY AND CAUSE			MITIGATION		
A	C	E	F	G	P
Risk ID	Risk Description (Hazard/Risk Scenario)	Cause	Effect	Risk Plan Owner	Risk Plan
Example:					
	Excessive groundwater flow into shaft and tunnel	Shaft location too close to stream bed	Impacts productivity of work	Jones, Andrew	Install Additional Standby Pumps
	Shutdown #1 impacts regional water supply system	Replacement of valve G14	Schedule, Cost, Environmental Conditions	WSTD Operations	Coordinate with Client/Operations Rep, SFPUC Shutdown Coordinator, Project Controls, Water Quality Bureau, Operations Staff, and Contractor
	Shutdown #2 is delayed or extended and thus impacts regional water supply system	Unforeseen complications during installation (under pipe) of valve B58P and (N) 42-inch Pipeline tie-in within tight timeframe	Delays concurrent pump testing and installation (critical path) and shutdowns	<enter name here>	Coordinate with Client/Operations Rep, SFPUC Shutdown Coordinator, Project Controls, Water Quality Bureau, Operations Staff, and Contractor

**Attachment 014 - 4
Risk Management Plan Required Content**

<<<PROJECT NAME>>>

<<<PROJECT LOCATION>>>

- 1. Introduction**
 - a. Description of Project
 - b. Major Risks to the Project Summarized
- 2. Methodology**
 - a. This may be similar to what is presented in this procedure
- 3. Definitions**
 - a. This may be similar to what is presented in this procedure
 - b. Any project-specific definitions should be indicated with an asterisk (*)
- 4. Roles and Responsibilities**
 - a. Identify the applicable persons involved and define each of their roles and responsibilities
- 5. Risk Categories**
 - a. This may be similar to what is presented in this procedure
- 6. Risk Register (Baseline)**
- 7. Meeting Minutes**
 - a. Meeting minutes of any meetings held in the development of this risk management plan
- 8. Summary**
- 9. Exhibits**

**Attachment 014 - 5
Revision Control Log**

Revision No.	Revision Date	What changed?
Rev 1	6/7/19	<ul style="list-style-type: none">• Minor format changes;• Attachments new added and revised;• Revision Control Log updated.
Rev 0	11/14/16	Signed