1.0 Policy

The Risk Management Plan is a project-specific strategic document prepared by the responsible CM team member (or CM Consultant), and approved by the City, for all projects associated with major capital improvement programs 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
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 a potential event, failure or condition that, if it occurs, will have a negative impact to 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 for delivering 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 Senior Project Manager (Senior PM), Construction Manager, 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**

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

The Construction Manager 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 Construction Manager.

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**

For a visual flowchart depicting this process, refer to Attachment 014-1.

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 014-4)

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 014–3 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 PCM will develop 3-point cost estimates for cost impacts to the SFPUC risks only with the assistance of the Project Risk Group or members of the RM team.

5.1.2.8 The PCM forwards the completed 3-point estimates for each risk and a scoring rationale to the RE for review and approval of the data.

5.1.2.9 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.

5.1.2.10 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.

5.1.2.11 Once approved, the Risk Analyst loads the final Baseline Risk Register into ARM and posts the Baseline Risk Register on S drive (S:/SFPUC Infrastructure CM Risk Management Report/Risk Register/Monthly report) and notifies the RE with an email.
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.

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 City Construction Manager with a copy to the Program Risk Manager with a recommendation for approval.

5.1.3.3 The Construction Manager 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 and post to the S drive (S:/Risk Management Report/Risk Register/Monthly report) 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.

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 S drive (S:/Risk Management Report/Risk Register/Monthly report) the SFPUC Infrastructure Top 10 Risk Register for the Construction Manager and/or the PM. The Risk Analyst will notify the team with an email when the Risk Register is available on the S 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 S-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 Once the CMIS is accommodating Risk Management within its Business Processes, the Risk Analyst 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**

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 Risk Management Plan Required Contents
014 - 4 Pre-Risk Assessment Workshop Questionnaire
014 - 5 Revision Control Log
## Risk Register Template

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<thead>
<tr>
<th>Risk ID</th>
<th>Risk Category</th>
<th>Risk Description</th>
<th>Likelihood</th>
<th>Impact</th>
<th>Likelihood of Occurrence</th>
<th>Mitigation</th>
<th>Severity</th>
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<td>Operations</td>
<td>Production of high-quality components</td>
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### Example:

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<th>Risk ID</th>
<th>Risk Category</th>
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<th>Likelihood of Occurrence</th>
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<td>Production of high-quality components</td>
<td>High</td>
<td>High</td>
<td>High</td>
<td>High</td>
<td>High</td>
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</tbody>
</table>

**Notes:**
- The risk register is a tool used to identify and prioritize risks to a project. It typically includes fields for the risk ID, risk category, risk description, likelihood, impact, likelihood of occurrence, mitigation, and severity. This helps in managing risks effectively by prioritizing them and implementing appropriate mitigation strategies.
## Probability Scale, Severity of Impact Scales to Cost and Schedule and Risk Score Matrix

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<th>Range</th>
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<tr>
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<tr>
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<td>&lt;20%</td>
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<td>.4% - .6% of total Project Cost</td>
</tr>
<tr>
<td>1</td>
<td>&lt;.4% of total Project Cost</td>
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</table>
Probability Scale, Severity of Impact Scales to Cost and Schedule, and Risk Score Matrix

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<td>4%-6% of total Project Schedule</td>
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Risk Score Matrix

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<th>3</th>
<th>4</th>
<th>5</th>
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Attachment 014 - 3
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
## Pre-Risk Assessment Workshop Questionnaire

**Preliminary Risk Assessment by:**  (Name)

<table>
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<tr>
<th>Risk ID</th>
<th>Risk Description (Hazard/Risk Scenario)</th>
<th>Cause</th>
<th>Effect</th>
<th>Risk Plan Owner</th>
<th>Risk Plan</th>
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<tr>
<td>XX</td>
<td>Unforeseen complications during installation (under pipe) of Valve R55P-6 (6-in. 43-inch Pipeline) within tight timeframe</td>
<td>Delays concurrent pump testing and installation (critical path) and shutdown</td>
<td>&lt;insert name here&gt;</td>
<td>Coordinate with Client/Operations Rep, SFPUC Shutdown Coordinator, Project Controls, Water Quality Bureau, Operations Staff, and Contractor</td>
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<p>| 01 |
| 02 |
| 03 |
| 04 |
| 05 |</p>
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